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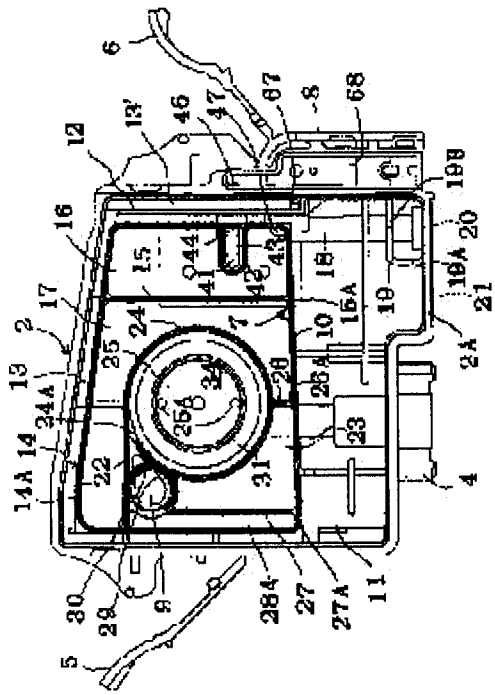
(54) INK STORAGE TANK



(57)Abstract:

PROBLEM TO BE SOLVED: To provide an ink storage tank which can stir inside ink by only a channel structure and a channel shape and effectively prevent ink from settling while hardly complicating a head structure or hardly increasing costs.

SOLUTION: An ink cartridge 1 for storing ink to be supplied to a recording head which discharges ink drops corresponding to printing signals is provided with a communication port 15A where ink flows. A stirring member 7 for stirring ink by changing the direction of the ink flowing the communication port 15A is set to the downstream side of the communication port 15A. The ink in the cartridge 1 is automatically stirred when flowing in the communication port 15A. The ink can be effectively prevented from settling by the simple structure without complicating the structure of the cartridge 1 or a recorder itself and without increasing costs as in the prior art.

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CLAIMS

[Claim(s)]
[Claim 1] The ink reservoir tank characterized by establishing a stirring means to have the passage section in which it is the ink reservoir tank which stores the ink supplied to the recording head which carries out the regurgitation of the ink droplet corresponding to a printing signal, and ink flows, to change the direction of the ink which flows the passage section near the above-mentioned passage section, and to stir ink.
[Claim 2] The ink reservoir tank according to claim 1 by which the stirring means is established near the passage section which is equipped with two or more ink rooms, and is open for free passage in the ink room of the downstream from the ink room of the upstream.
[Claim 3] The ink reservoir tank according to claim 2 by which the above-mentioned stirring means is formed in the downstream of the passage section.
[Claim 4] The ink reservoir tank according to claim 2 or 3 set up so that the downstream opening area of the above-mentioned passage section may become smaller than upstream opening area.
[Claim 5] An ink reservoir tank given in any 1 term of claims 2-4 in which the above-mentioned stirring means is formed so that ink may flow toward a top from under the ink reservoir tank of a busy condition.
[Claim 6] An ink reservoir tank given in any 1 term of claims 2-4 in which the above-mentioned stirring means is formed so that the vortex of ink may be generated at the ink room of the downstream.
[Claim 7] The ink reservoir tank characterized by forming the inclined plane to the migration direction of carriage in the ink interior of a room which is the ink reservoir tank which stores the ink supplied to the recording head which is carried in the carriage which carries out both-way migration along with a record medium, and carries out the regurgitation of the ink droplet corresponding to a printing signal, and stores ink.
[Claim 8] The ink reservoir tank according to claim 7 by which the above-mentioned inclined plane is formed in the base of an ink room.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the ink reservoir tank which stores the ink supplied to the recording head which carries out the regurgitation of the ink droplet

corresponding to a printing signal.
[0002]
[Description of the Prior Art] Generally, what homogeneity was made to distribute particulate materials, such as a pigment, in a solvent, and mixed the ink used for an ink jet recording device is used. Printing is not performed over a long period of time, but when such ink is placed in the condition that ink does not circulate, into the ink stores dept., it has the property in which a particulate material descends and precipitates with the specific gravity difference of a solvent and a particulate material.
[0003] To precipitate of such a particulate material, in order to maintain concentration uniformly, forming churning equipment has been examined. For example, with the ink jet type mark copy equipment indicated by JP,5-229140,A, in order to agitate effectively ink with high viscosity, and the ink containing a pigment with large specific gravity, the revolving shaft which gives an impeller and it rotation is established in an ink stores dept., and making it rotate with a drive motor from the outside of an ink stores dept. is performed.
[0004] However, with the above-mentioned equipment, since the structure of preparing an impeller and a revolving shaft in an ink stores dept. is taken, while an ink stores dept. is enlarged, there is a problem that the drive of an impeller or a revolving shaft is required and equipment itself becomes complicated. Moreover, when the ink residue of an ink stores dept. becomes below fixed, the function of an impeller is halved and there is also a problem that sufficient stirring effect is not expectable.
[0005] As what solves such a problem, the electrostatic ink jet recording device indicated by JP,10-286962,A is devised. In this recording device, the churning electrode of an opposite pair is arranged inside an ink stores dept., fixed time amount and alternating voltage are impressed, and a polarity is changed. Thereby, even when an electrification toner precipitates within an ink stores dept., the electrification toner which precipitated by polar change of a churning electrode moves to a low-battery side repeatedly, and a churning operation arises in the precipitating electrification toner, and it becomes ink of concentration regularity.
[Problem(s) to be Solved by the Invention] However, the control controller which prepares the stirring electrode of a pair in an ink stores dept., impresses alternating voltage to a stirring electrode from the exterior of an ink stores dept., and changes a polarity also with the above-mentioned ink jet type recording device is required. For this reason, the structure of an ink stores dept. and equipment itself was complicated, and the cost rise of equipment or the ink stores dept. itself was not avoided, but it was unsuitable for the especially exchangeable ink cartridge.
[0006] This invention was made in view of such a situation, and it aims at offer of the ink reservoir tank which can prevent sedimentation of ink effectively, without being able to stir internal ink only in passage structure or a configuration, and carrying out most of complication and cost rise of head structure.
[0007]
[Means for Solving the Problem] Let it be the 1st summary to establish a stirring means have the passage section in which it is the ink reservoir tank which stores the ink supplied to the recording head to which the ink reservoir tank of this invention carries out the regurgitation of the ink droplet corresponding to a printing signal in order to attain the above-mentioned purpose, and ink flows, change the direction of the ink which flows the

passage section near the above-mentioned passage section, and stir ink.
[0008] That is, the above-mentioned ink reservoir tank is equipped with the passage section in which ink flows, and since a stirring means to change the direction of the ink which flows the passage section near the above-mentioned passage section, and to stir ink is established, in case the above-mentioned passage section is flowed, the ink in an ink reservoir tank is stirred automatically. Therefore, sedimentation of ink can be effectively prevented with simple structure like before, without carrying out complication and cost rise of the structure of an ink stores dept. or the recording device itself.
[0009] In the ink reservoir tank of this invention, it has two or more ink rooms, and when the stirring means is established near the passage section which is open for free passage in the ink room of the downstream from the ink room of the upstream, or when the above-mentioned stirring means is formed in the downstream of the passage section, in the ink reservoir tank equipped with two or more ink rooms, sedimentation of ink can be prevented effectively.
[0010] In the ink reservoir tank of this invention, when being set up so that the downstream opening area of the above-mentioned passage section may become smaller than upstream opening area, the rate of flow of the ink which passes the passage section becomes quick, and the stirring effectiveness improves.
[0011] In the ink reservoir tank of this invention, when the above-mentioned stirring means is formed so that ink may flow toward a top from under the ink reservoir tank of a busy condition, or when the above-mentioned stirring means is formed so that the vortex of ink may be generated at the ink room of the downstream, sedimentation of ink can be effectively prevented with simple structure.
[0012] Moreover, the ink reservoir tank of this invention is an ink reservoir tank which stores the ink supplied to the recording head which is carried in the carriage which carries out both-way migration along with a record medium, and carries out the regurgitation of the ink droplet corresponding to a printing signal, and makes it the 2nd summary to form the inclined plane to the migration direction of carriage in the ink interior of a room which stores ink.
[0013] That is, since the inclined plane to the migration direction of carriage is formed in the ink interior of a room which stores ink, the ink which rocks the ink interior of a room in the migration direction of carriage with both-way migration of carriage produces the flow to the vertical direction along the above-mentioned inclined plane, and the above-mentioned ink reservoir tank is stirred automatically. Therefore, sedimentation of ink can be effectively prevented with simple structure like before, without carrying out complication and cost rise of the structure of an ink stores dept. or the recording device itself.
[0014] In the ink reservoir tank of this invention, when the above-mentioned inclined plane is formed in the base of an ink room, even if the ink of the ink interior of a room runs short, it stirs effectively.
[0015]
[Embodiment of the Invention] Below, the gestalt of operation of this invention is explained in detail.
[0016] Drawing 1 is drawing showing an example of the circumference structure of an ink jet type recording device where the ink reservoir tank of this invention is applied. This equipment is equipped with the carriage 75 with which the recording head 73 was

attached while the ink cartridge (henceforth a "cartridge") 1 to which this invention was applied is carried.
[0017] It connects with a stepping motor 79 through a timing belt 77, and the above-mentioned carriage 75 is guided at a guide bar 78, and carries out both-way migration in the paper width direction (main scanning direction) of the recording paper 76. The above-mentioned carriage 75 presents the core box opened in the upper part, and a cartridge 1 is carried, while being attached in the recording paper 76 and the field (this example inferior surface of tongue) which counters so that it may be exposed of the nozzle side of a recording head 73.
[0018] And ink being supplied to the above-mentioned recording head 73 from a cartridge 1, and moving carriage 75, recording paper 76 top face is made to breathe out an ink droplet, and an image and an alphabetic character are printed by the dot matrix on the recording paper 76.
[0019] Drawing 2 and drawing 3 are the decomposition perspective views showing the above-mentioned cartridge 1. This cartridge 1 is equipped with the body 2 of a container of the flat shape of a rectangle with which one field (right lateral in drawing 2) carried out opening, and the lid 3 which closes the above-mentioned opening. The above-mentioned body 2 of a container and the lid 3 are formed by each from synthetic resin.
[0020] Drawing 4 shows the condition of having seen the above-mentioned body 2 of a container from the opening side. The ink feed hopper 4 is formed in the apical surface (this example inferior surface of tongue) of the path of insertion of the above-mentioned body 2 of a container, and the stop members 5 and 6 are formed in the side face of the right and left in drawing 4 in one with the body 2 of a container, respectively. The valve element (not shown) which opens by insertion of an ink supply needle is held in the above-mentioned ink feed hopper 4. In addition, in drawing 2 and drawing 3 , 2B is a crevice in which the storage means (not shown) formed in the lower part of the stop member 5 by the side of the ink feed hopper 4 is held.
[0021] Two ****s of the interior of the above-mentioned body 2 of a container are carried out up and down with the wall 10 prolonged so that it may be on the ink feed hopper 4 side with a declivity a little in an abbreviation horizontal direction. The field below the above-mentioned wall 10 is formed in the 1st ink room 11 in which ink is held.
[0022] The field above the above-mentioned wall 10 gives the internal surface of the body 2 of a container, and the clearance between abbreviation regularity by the frame 14 including a wall 10, and is divided. The atmospheric-air free passage way 13 and 13' which make the 1st ink room 11 open for free passage with atmospheric air through a through-hole 67 with the clearance formed between the above-mentioned frame 14 and the internal surface of the body 2 of a container and the wall 12 prepared in the bulb hold room 8 side of the above-mentioned frame 14 are formed. Welding of the lid 3 is carried out to the above-mentioned wall 12 and the peripheral wall of the body 2 of a container, and atmospheric-air free passage way 13' is formed.
[0023] The interior of the above-mentioned frame 14 is divided into right and left by the wall 15 prolonged in the lengthwise direction where free passage opening 15A to which ink circulates was formed in the pars basilaris ossis occipitalis. And the field located in the right-hand side of the illustration divided with the above-mentioned wall 15 is formed in the 3rd ink room 16 which sucks up the ink of the 1st ink room 11 and is stored temporarily. Moreover, the field located in the left-hand side of illustration is formed in

the 3rd ink room 17 in which the differential pressure regulating valve which consists of a film valve 52 and spring 50 grade is held.
[0024] The free passage passage 18 which connects the between the 3rd ink room 16 and near the base 2A of the body 2 of a container, and introduces the ink of the 1st ink room 11 into the 3rd ink room 16 is formed in the field corresponding to the 3rd ink room 16 of the above-mentioned 1st ink room 11. The rectangular field where the perimeter was surrounded with the wall 19 is formed in the lower part of the above-mentioned free passage passage 18, and the free passage openings 19A and 19B are formed in the lower part and top face at the above-mentioned wall 19, respectively.
[0025] The above-mentioned free passage passage 18 forms groove crevice 18A in the front face (the field of the opposite side is hereafter called "front face of the body 2 of a container" the opening side of the body 2 of a container) of the body 2 of a container, and is formed by closing this crevice 18A with the film (not shown) of air barrier property.
[0026] And the upper part is open for free passage with the 3rd ink room 16 through the free passage opening 47, opening (not shown) is formed in the field of the rectangle surrounded with the lower wall 19, and the above-mentioned free passage passage 18 is open for free passage with the 1st ink room 11. By this, it is open for free passage through the 1st ink room 11, a buffer room, and the free passage passage 18, the ink of the 1st ink room 11 is introduced into the 3rd ink room 16, and it gets.
[0027] Moreover, the ink inlet 20 used in case ink is poured into the 1st ink room 11 is formed in the part which counters the free passage passage 18 at base 2A of the body 2 of a container. Furthermore, near the above-mentioned ink inlet 20, the air exhaust port 21 which discharges air in the case of ink impregnation is formed.
[0028] The wall 22 which separates predetermined spacing between top-face 14A of a frame 14, and is prolonged in a longitudinal direction is formed in the above-mentioned 3rd ink room 17. Moreover, the above-mentioned 3rd ink room 17 is divided with the wall 24 which presents the approximate circle arc which followed the above-mentioned wall 22, and the part surrounded by the above-mentioned wall 24 has become the field in which the differential-pressure-regulating-valve hold room 33 and the filter hold room 34 are formed.
[0029] Furthermore, while forming the differential-pressure-regulating-valve hold room 33 in the front-face side of the thickness direction of the field surrounded with the wall 24 of the above-mentioned approximate circle arc, and the field which counters, 2 ****s is carried out in the thickness direction with the wall 25 so that the filter hold room 34 may be formed in an opening side. The filter attachment section 31 of the cartridge to which joining of the filter 55 is carried out, and it fixes a filter 55 is formed in the interior of the above-mentioned filter hold room 34. Ink circulation opening 25A which leads the ink which passed the filter 55 to the differential-pressure-regulating-valve hold room 33 is prepared in the above-mentioned wall 25.
[0030] The partition wall 26 equipped with free passage opening 26A between walls 10 is formed in the lower part of the wall 24 of the above-mentioned approximate circle arc, and the downstream (left-hand side in drawing 4) is formed in the 4th ink room 23 from this wall 26. Moreover, between the wall 24 of the above-mentioned approximate circle arc, and a frame 14, the partition wall 27 prolonged in a lengthwise direction in preparation for the lower part in free passage opening 27A is established, and ink passage 28A is formed.

[0031] Moreover, while following the upper limit section of the above-mentioned wall 27, the wall 30 of the shape of radii formed so that it might connect with the wall 24 and wall 22 of an approximate circle arc is formed. And the field surrounded by the radii wall 30 of the above is formed in the ink circulation space 9.
[0032] And ranging over the wall 30 of the shape of radii which forms the above-mentioned ink circulation space 9, the through hole 29 of the configuration which connected the great circle and the small circle is formed. And the great-circle side of the above-mentioned through hole 29 is open for free passage in the upper part of ink passage 28A, and the small-circle side of a through hole 29 is open for free passage in the upper part of the filter hold room 34 through free passage opening 24A prepared in the point of the wall 24 of an approximate circle arc. Thereby, ink passage 28A and the filter hold room 34 are open for free passage through the above-mentioned through hole 29.
[0033] And the ink which passed the free passage openings 15A, 26A, and 27A from the 3rd ink room 16, and flowed into ink passage 28A passes through the ink circulation space 9, and flows into the great-circle side of a through hole 29. Subsequently, the ink which flowed into the through hole 29 flows into the filter hold room 34 through free passage opening 24A from the small-circle side of a through hole 29.
[0034] Here, the stirring member 7 which the direction of the ink which passed free passage opening 15A is changed to the part of the downstream of free passage opening 15A to which ink flows toward the 3rd ink room 17 of the downstream from the 3rd ink room 16 of the upstream, and stirs ink into it is formed.
[0035] The above-mentioned stirring member 7 and its circumference structure are explained in detail using drawing 5 which is an enlarged drawing. The above-mentioned free passage opening 15A is formed in the lower limit section of a wall 15 which divides the 3rd ink room 16 and the 3rd ink room 17, and the ink of the 3rd ink room 16 flows to the 3rd ink room 17 in accordance with the wall 10 which forms the bottom of the 3rd ink room 16 and the 3rd ink room 17. From opening of the upstream, opening area is formed so that it may become small, and it raises the rate of flow of the ink which flows free passage opening 15A, and the opening of the downstream deals in the above-mentioned free passage opening 15A.
[0036] And the above-mentioned stirring member 7 is projected and formed in the location of the downstream from the above-mentioned free passage opening 15A of the wall 10 which forms the bottom of the 3rd ink room 17. Acclivity side 7A the flow of the ink which passed free passage opening 15A is made to go to the part which meets downstream opening of free passage opening 15A up is formed in the above-mentioned stirring member 7. The ink which flowed free passage opening 15A and flowed into the 3rd ink room 17 by this flows toward a top from the bottom.
[0037] Gradually [top], as for the above-mentioned inclined plane 7A, whenever [tilt-angle] is formed so that it may become large. Thereby, the ink which flowed up along with inclined plane 7A may have comes to generate a vortex in the 3rd ink room 17.
[0038] On the other hand, the lower part and the ink feed hopper 4 of the above-mentioned differential-pressure-regulating-valve hold room 33 are opened for free passage by the passage which consists of wrap air blocking film (not shown) the groove crevice 35 formed in the front-face side, and this crevice 35. Thereby, the ink which flowed into the filter hold room 34 is filtered with a filter 55, passes through hole 25A, and flows to the ink feed hopper 4 from the passage formed through the differential-

pressure-regulating-valve hold room 33 in a crevice 35.
[0039] On the other hand, the rill 36 which moves in a zigzag direction so that passage resistance may become high if possible, and the broad slot 37 which is open for free passage to the above-mentioned rill 36, and surrounds the differential-pressure-regulating-valve hold room 33 and the perimeter of a rill 36 are formed in the front face of the body 2 of a container. Moreover, the rectangle-like crevice 38 is formed in the field corresponding to the 3rd ink room 16 in the front face of the above-mentioned body 2 of a container.
[0040] In the rectangle crevice 38 of the above, the frame part 39 and the rib 40 are formed in the condition of falling by one step. And the inside of the rectangle crevice 38 of the above is formed in the atmospheric-air draught chamber which is open for free passage to atmospheric air through a rill 36 and a slot 37 by stretching the breathable film (not shown) which has ** ink nature in these.
[0041] A through hole 41 is drilled by the inner side of the above-mentioned crevice 38, and the long and slender field 43 divided with the wall 42 in the 3rd ink room 16 is open for free passage. Moreover, in the field by the side of a front face, the rill 36 is open for free passage from the breathable film of the above-mentioned crevice 38. furthermore, the above -- the through hole 44 is drilled in the through hole 41 of the long and slender field 43, and the edge of the opposite side. This through hole 44 is opened for free passage by the bulb hold room 8 which is an atmospheric-air open-valve room through the through hole 46 drilled so that it might be open for free passage with the slot 45 for a free passage formed in the front-face side of the body 2 of a container, and the above-mentioned slot 45.
[0042] That cartridge insertion side (this example under) is opened wide, the bulb hold room 8 is formed possible [penetration of the piece of discernment and bulb actuation lever which were formed in the body of a recording apparatus], and the atmospheric-air open valve which opens by penetration of an actuation lever and always maintains an open-valve condition is held in the upper part.
[0043] drawing 6 -- the above-mentioned filter hold room 34 and a differential-pressure-regulating-valve hold room -- about 33 cross-section structure is shown. In addition, the right-hand side of illustration is a front-face side of the body 2 of a container with the differential-pressure-regulating-valve hold room 33. It is constituted with a spring 50 and the ingredient in which elastic deformation, such as an elastomer, is possible by the above-mentioned differential-pressure-regulating-valve hold room 33, and the film valve 52 which equipped the core with the through hole 51 is held in it. That perimeter has annular heavy-gage part 52A, and the above-mentioned film valve 52 is being fixed to the body 2 of a container through the frame part 54 formed in this heavy-gage part 52A at one. Moreover, an end is contacted by spring receptacle section 52B of a film valve 52, and the above-mentioned spring 50 is contacted and supported by spring receptacle section 53A of the lid 53 with which the other end covers with the lid of the differential-pressure-regulating-valve hold room 33.
[0044] In addition, in drawing, 56 and 57 are air blocking film stuck on the front-face [of the body 2 of a container], and effective area side. Joining of the air blocking film 56 is carried out to walls 10, 15, 22, 24, 30, and 42, a frame 14, and the partition walls 26, 27, and 32.
[0045] The ink which passed ink circulation opening 25A through the filter 55 by such

configuration has circulation prevented by the film valve 52. If the pressure of the ink feed hopper 4 declines in this condition, a film valve 52 will resist the energization force of a spring 50 with that negative pressure, it will separate from valve seat section 25B, and ink will flow into the ink feed hopper 4 via the passage which passed through the through hole 51 and was formed in the crevice 35.

[0046] If the ink pressure of the ink feed hopper 4 rises to a predetermined value, a film valve 52 will be ****(ed) by valve seat section 25B according to the energization force of a spring 50, and circulation of ink will be intercepted. Ink can be discharged from the ink feed hopper 4, maintaining fixed negative pressure by repeating such actuation.

[0047] Drawing 7 shows the cross-section structure of the bulb hold room 8 for an atmospheric-air free passage. A through hole 60 is drilled by the wall which divides the above-mentioned bulb hold room 8, and in the perimeter, the press member 61 constituted by elastic members, such as rubber, here is supported by the body 2 of a container, and is inserted movable. At the tip by the side of penetration of the above-mentioned press member 61, the valve element 65 which was supported by the elastic member 62 and was always energized by the through hole 60 is arranged. In this example, as for the above-mentioned elastic member 62, the flat spring by which the lower limit was fixed by the projection 63 and the center section was regulated by the projection 64 is used.

[0048] On the other hand, the arm 66 is arranged in the opposite side of the above-mentioned press member 61. The above-mentioned arm 66 is being fixed to the body 2 of a container through rotation supporting-point 66A to which the path-of-insertion side (this example lower limit) of that cartridge 1 is located inside the actuation lever 70 mentioned later. Moreover, that drawing side (this example upper part side) has projected the above-mentioned arm 66 aslant to the admission passage of the actuation lever 70. Heights 66B which oppresses the press member 61 is formed at the tip of the above-mentioned arm 66. By such configuration, the through-hole 67 prepared in the upper part of the 1st ink room 11 is connected to the crevice 38 for an atmospheric-air free passage through a through hole 60 at the time of valve opening of a valve element 65.

[0049] As shown in drawing 8 , when the cartridge holder 71 with which the actuation lever 70 was set up by the inferior surface of tongue is loaded with a cartridge 1, the arm 66 toward which the actuation lever 70 inclined is contacted, and heights (press member) 61 are made to incline in a valve element 65 side with pushing of a cartridge 1 by such configuration. Thereby, a valve element 65 separates and makes atmospheric air open the crevice 38 for an atmospheric-air free passage wide through the through hole 46 mentioned above, a slot 45, a through hole 44, a field 43, and a through hole 41 from a through hole 60.

[0050] Moreover, since an arm 66 loses support of the actuation lever 70 when drawn out from the cartridge holder 71, a valve element 65 blocks a through hole 60 according to the energization force of a flat spring 62, and a free passage with an ink hold field and atmospheric air is severed. In addition, in drawing, a sign 72 shows the ink supply needle which supplies ink to the ink jet recording head 73.

[0051] Where all the members, such as a valve, are included in the body 2 of a container as mentioned above, air blocking film is stuck on a front face so that the field in which the crevice is formed at least may be covered. Thereby, the capillary which serves as an atmospheric-air free passage way with a crevice and a film is formed in a front-face side.

[0052] Moreover, air blocking film 56 is stuck on opening of the body 2 of a container by heat joining etc. so that it may become in airtight to each wall mentioned above. And a lid 3 is put from moreover and joining etc. is fixed. The closure is carried out so that the field divided with each wall may be open for free passage through free passage opening or opening by this.
[0053] Furthermore, the closure also of the opening side of the bulb hold room 8 is similarly carried out by heat joining by air-blocking-film 56', and a cartridge 1 is made to it. Thus, by taking the structure which closes an ink hold field by air-blocking-film 56 grade, it becomes possible it not only can to fabricate the body 2 of a container easily, but to absorb rocking of the ink resulting from reciprocation of carriage according to film deformation of air blocking film 56, and to maintain an ink pressure as uniformly as possible.
[0054] Subsequently, while inserting an ink filling pipe in the ink inlet 20, where the air exhaust port 21 is opened wide, the fully deaerated ink is poured in. After impregnation is completed, the ink inlet 20 and the air exhaust port 21 are closed with a film or a plug.
[0055] Thus, since a free passage with atmospheric air is severed by the valve etc. and the constituted cartridge 1 is saved, whenever [degassing / of ink] is fully maintained.
[0056] And in case the cartridge holder 71 is loaded with a cartridge 1, as advanced and mentioned above to the location where the ink feed hopper 4 is inserted in the ink supply needle 72, a through hole 60 is wide opened with the actuation lever 70, an ink hold field is open for free passage to atmospheric air, and the bulb of the ink feed hopper 4 is also opened with the ink supply needle 72.
[0057] The cartridge holder 71 is normally equipped with a cartridge 1, and if printing is performed and ink is consumed by the recording head 73, since the pressure of the ink feed hopper 4 will fall below to default value, a film valve 52 is opened wide as mentioned above. Moreover, if the pressure of the ink feed hopper 4 rises, a film valve 52 will close the valve. Thus, the ink maintained by predetermined negative pressure flows into a recording head 73.
[0058] If consumption of the ink in a recording head 73 advances, the ink of the 1st ink room 11 will flow into the 3rd ink room 16 through the free passage passage 18. The air bubbles which flowed in here go up by buoyancy, and only ink flows into the 3rd ink room 17 via lower free passage opening 15A.
[0059] At this time, as shown in drawing 9 , the ink which passed free passage opening 15A from the 3rd ink room 16 flows along with inclined plane 7A of the stirring member 7, raising the rate of flow, changes a direction and flows toward the upper part. And flow is interrupted with the wall 24 of the shape of radii formed in the 3rd ink room 17, a vortex is generated in the 3rd ink room 17, and ink is stirred.
[0060] And the ink in the stirred 3rd ink room 17 passes free passage opening 26A of a wall 26 which divides the filter hold room 34, passes along the 4th ink room 23, and flows into ink passage 28A.
[0061] The ink which flowed ink passage 28A flows into the ink circulation space 9. The ink which passed through the above-mentioned ink circulation space 9 flows a small-circle side from the great-circle side of a through hole 29, passes free passage opening 24A, and flows into the upper part of the filter hold room 34.
[0062] Subsequently, the ink which flowed into the filter hold room 34 flows into the ink feed hopper 4 with predetermined negative pressure by the switching action of a film

valve 52, as it is filtered with a filter 55, through hole 25A is passed, and it flows into the differential-pressure-regulating-valve hold room 33 and being mentioned above.
[0063] Here, since atmospheric air is open for free passage through the atmospheric-air free passage way 13, 13', and a through-hole 67 and the 1st ink room 11 is maintained by atmospheric pressure, it is not negative pressure's occurring and checking the flow of ink.
[0064] Thus, in the above-mentioned cartridge 1, since the stirring member 7 which the direction of ink is changed from the 3rd ink room 16 to the downstream of free passage opening 15A to which ink flows toward the 3rd ink room 17, and stirs ink is formed, in case the above-mentioned free passage opening 15A is flowed, the ink in a cartridge 1 is stirred automatically. Therefore, sedimentation of ink can be effectively prevented with simple structure like before, without carrying out complication and cost rise of the structure of an ink stores dept. or the recording device itself.
[0065] Drawing 10 and drawing 11 show the gestalt of operation of the 2nd of this invention. In this example, the inclined plane 32 to the migration direction (the arrow head B of illustration) of carriage 75 is formed in the base of the 3rd ink room 17. As for the above-mentioned inclined plane 32, the bottom is formed so that whenever [tilt-angle] may become gradually large.
[0066] By this, the ink which rocks the inside of the 3rd ink room 17 in the migration direction of carriage 75 with both-way migration of carriage 75 produces the flow to the vertical direction along the above-mentioned inclined plane 32, and serves as an eddy, and it stirs automatically. Moreover, since it is formed in the base of the 3rd ink room 17, the above-mentioned inclined plane 32 is effectively stirred, even if the ink in the 3rd ink room 17 runs short. Except it, it is the same as that of the gestalt of the above-mentioned implementation, and the same sign is given to the same part. Also by this cartridge, the same operation effectiveness as the gestalt of the above-mentioned implementation is done so.
[0067]
[Effect of the Invention] As mentioned above, since the stirring member which it has the passage section in which ink flows, and the direction of the ink which flows the passage section is changed near the above-mentioned passage section, and stirs ink is prepared according to the 1st ink reservoir tank of this invention, in case the above-mentioned passage section is flowed, the ink in an ink reservoir tank is stirred automatically. Therefore, sedimentation of ink can be effectively prevented with simple structure like before, without carrying out complication and cost rise of the structure of an ink stores dept. or the recording device itself.
[0068] Moreover, since the inclined plane to the migration direction of carriage is formed in the ink interior of a room which stores ink according to the 2nd ink reservoir tank of this invention, the ink which rocks the ink interior of a room in the migration direction of carriage with both-way migration of carriage produces the flow to the vertical direction along the above-mentioned inclined plane, and is stirred automatically. Therefore, sedimentation of ink can be effectively prevented with simple structure like before, without carrying out complication and cost rise of the structure of an ink stores dept. or the recording device itself.

TECHNICAL FIELD

[Field of the Invention] This invention relates to the ink reservoir tank which stores the ink supplied to the recording head which carries out the regurgitation of the ink droplet corresponding to a printing signal.

PRIOR ART

[Description of the Prior Art] Generally, what homogeneity was made to distribute particulate materials, such as a pigment, in a solvent, and mixed the ink used for an ink jet recording device is used. Printing is not performed over a long period of time, but when such ink is placed in the condition that ink does not circulate, into the ink stores dept., it has the property in which a particulate material descends and precipitates with the specific gravity difference of a solvent and a particulate material.

[0003] To precipitate of such a particulate material, in order to maintain concentration uniformly, forming churning equipment has been examined. For example, with the ink jet type mark copy equipment indicated by JP,5-229140,A, in order to agitate effectively ink with high viscosity, and the ink containing a pigment with large specific gravity, the revolving shaft which gives an impeller and it rotation is established in an ink stores dept., and making it rotate with a drive motor from the outside of an ink stores dept. is performed.

[0004] However, with the above-mentioned equipment, since the structure of preparing an impeller and a revolving shaft in an ink stores dept. is taken, while an ink stores dept. is enlarged, there is a problem that the drive of an impeller or a revolving shaft is required and equipment itself becomes complicated. Moreover, when the ink residue of an ink stores dept. becomes below fixed, the function of an impeller is halved and there is also a problem that sufficient stirring effect is not expectable.

[0005] As what solves such a problem, the electrostatic ink jet recording device indicated by JP,10-286962,A is devised. In this recording device, the churning electrode of an opposite pair is arranged inside an ink stores dept., fixed time amount and alternating voltage are impressed, and a polarity is changed. Thereby, even when an electrification toner precipitates within an ink stores dept., the electrification toner which precipitated by polar change of a churning electrode moves to a low-battery side repeatedly, and a churning operation arises in the precipitating electrification toner, and it becomes ink of concentration regularity.

EFFECT OF THE INVENTION

[Effect of the Invention] As mentioned above, since the stirring member which it has the passage section in which ink flows, and the direction of the ink which flows the passage section is changed near the above-mentioned passage section, and stirs ink is prepared according to the 1st ink reservoir tank of this invention, in case the above-mentioned passage section is flowed, the ink in an ink reservoir tank is stirred automatically. Therefore, sedimentation of ink can be effectively prevented with simple structure like before, without carrying out complication and cost rise of the structure of an ink stores

dept. or the recording device itself.
[0068] Moreover, since the inclined plane to the migration direction of carriage is formed in the ink interior of a room which stores ink according to the 2nd ink reservoir tank of this invention, the ink which rocks the ink interior of a room in the migration direction of carriage with both-way migration of carriage produces the flow to the vertical direction along the above-mentioned inclined plane, and is stirred automatically. Therefore, sedimentation of ink can be effectively prevented with simple structure like before, without carrying out complication and cost rise of the structure of an ink stores dept. or the recording device itself.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, the control controller which prepares the stirring electrode of a pair in an ink stores dept., impresses alternating voltage to a stirring electrode from the exterior of an ink stores dept., and changes a polarity also with the above-mentioned ink jet type recording device is required. For this reason, the structure of an ink stores dept. and equipment itself was complicated, and the cost rise of equipment or the ink stores dept. itself was not avoided, but it was unsuitable for the especially exchangeable ink cartridge.
[0006] This invention was made in view of such a situation, and it aims at offer of the ink reservoir tank which can prevent sedimentation of ink effectively, without being able to stir internal ink only in passage structure or a configuration, and carrying out most of complication and cost rise of head structure.

MEANS

[Means for Solving the Problem] Let it be the 1st summary to establish a stirring means have the passage section in which it is the ink reservoir tank which stores the ink supplied to the recording head to which the ink reservoir tank of this invention carries out the regurgitation of the ink droplet corresponding to a printing signal in order to attain the above-mentioned purpose, and ink flows, change the direction of the ink which flows the passage section near the above-mentioned passage section, and stir ink.
[0008] That is, the above-mentioned ink reservoir tank is equipped with the passage section in which ink flows, and since a stirring means to change the direction of the ink which flows the passage section near the above-mentioned passage section, and to stir ink is established, in case the above-mentioned passage section is flowed, the ink in an ink reservoir tank is stirred automatically. Therefore, sedimentation of ink can be effectively prevented with simple structure like before, without carrying out complication and cost rise of the structure of an ink stores dept. or the recording device itself.
[0009] In the ink reservoir tank of this invention, it has two or more ink rooms, and when the stirring means is established near the passage section which is open for free passage in the ink room of the downstream from the ink room of the upstream, or when the above-mentioned stirring means is formed in the downstream of the passage section, in the ink reservoir tank equipped with two or more ink rooms, sedimentation of ink can be

prevented effectively.
[0010] In the ink reservoir tank of this invention, when being set up so that the downstream opening area of the above-mentioned passage section may become smaller than upstream opening area, the rate of flow of the ink which passes the passage section becomes quick, and the stirring effectiveness improves.
[0011] In the ink reservoir tank of this invention, when the above-mentioned stirring means is formed so that ink may flow toward a top from under the ink reservoir tank of a busy condition, or when the above-mentioned stirring means is formed so that the vortex of ink may be generated at the ink room of the downstream, sedimentation of ink can be effectively prevented with simple structure.
[0012] Moreover, the ink reservoir tank of this invention is an ink reservoir tank which stores the ink supplied to the recording head which is carried in the carriage which carries out both-way migration along with a record medium, and carries out the regurgitation of the ink droplet corresponding to a printing signal, and makes it the 2nd summary to form the inclined plane to the migration direction of carriage in the ink interior of a room which stores ink.
[0013] That is, since the inclined plane to the migration direction of carriage is formed in the ink interior of a room which stores ink, the ink which rocks the ink interior of a room in the migration direction of carriage with both-way migration of carriage produces the flow to the vertical direction along the above-mentioned inclined plane, and the above-mentioned ink reservoir tank is stirred automatically. Therefore, sedimentation of ink can be effectively prevented with simple structure like before, without carrying out complication and cost rise of the structure of an ink stores dept. or the recording device itself.
[0014] In the ink reservoir tank of this invention, when the above-mentioned inclined plane is formed in the base of an ink room, even if the ink of the ink interior of a room runs short, it stirs effectively.
[0015]
[Embodiment of the Invention] Below, the gestalt of operation of this invention is explained in detail.
[0016] Drawing 1 is drawing showing an example of the circumference structure of an ink jet type recording device where the ink reservoir tank of this invention is applied. This equipment is equipped with the carriage 75 with which the recording head 73 was attached while the ink cartridge (henceforth a "cartridge") 1 to which this invention was applied is carried.
[0017] It connects with a stepping motor 79 through a timing belt 77, and the above-mentioned carriage 75 is guided at a guide bar 78, and carries out both-way migration in the paper width direction (main scanning direction) of the recording paper 76. The above-mentioned carriage 75 presents the core box opened in the upper part, and a cartridge 1 is carried, while being attached in the recording paper 76 and the field (this example inferior surface of tongue) which counters so that it may be exposed of the nozzle side of a recording head 73.
[0018] And ink being supplied to the above-mentioned recording head 73 from a cartridge 1, and moving carriage 75, recording paper 76 top face is made to breathe out an ink droplet, and an image and an alphabetic character are printed by the dot matrix on the recording paper 76.

[0019] Drawing 2 and drawing 3 are the decomposition perspective views showing the above-mentioned cartridge 1. This cartridge 1 is equipped with the body 2 of a container of the flat shape of a rectangle with which one field (right lateral in drawing 2) carried out opening, and the lid 3 which closes the above-mentioned opening. The above-mentioned body 2 of a container and the lid 3 are formed by each from synthetic resin.
[0020] Drawing 4 shows the condition of having seen the above-mentioned body 2 of a container from the opening side. The ink feed hopper 4 is formed in the apical surface (this example inferior surface of tongue) of the path of insertion of the above-mentioned body 2 of a container, and the stop members 5 and 6 are formed in the side face of the right and left in drawing 4 in one with the body 2 of a container, respectively. The valve element (not shown) which opens by insertion of an ink supply needle is held in the above-mentioned ink feed hopper 4. In addition, in drawing 2 and drawing 3 , 2B is a crevice in which the storage means (not shown) formed in the lower part of the stop member 5 by the side of the ink feed hopper 4 is held.
[0021] Two ****s of the interior of the above-mentioned body 2 of a container are carried out up and down with the wall 10 prolonged so that it may be on the ink feed hopper 4 side with a declivity a little in an abbreviation horizontal direction. The field below the above-mentioned wall 10 is formed in the 1st ink room 11 in which ink is held.
[0022] The field above the above-mentioned wall 10 gives the internal surface of the body 2 of a container, and the clearance between abbreviation regularity by the frame 14 including a wall 10, and is divided. The atmospheric-air free passage way 13 and 13' which make the 1st ink room 11 open for free passage with atmospheric air through a through-hole 67 with the clearance formed between the above-mentioned frame 14 and the internal surface of the body 2 of a container and the wall 12 prepared in the bulb hold room 8 side of the above-mentioned frame 14 are formed. Welding of the lid 3 is carried out to the above-mentioned wall 12 and the peripheral wall of the body 2 of a container, and atmospheric-air free passage way 13' is formed.
[0023] The interior of the above-mentioned frame 14 is divided into right and left by the wall 15 prolonged in the lengthwise direction where free passage opening 15A to which ink circulates was formed in the pars basilaris ossis occipitalis. And the field located in the right-hand side of the illustration divided with the above-mentioned wall 15 is formed in the 3rd ink room 16 which sucks up the ink of the 1st ink room 11 and is stored temporarily. Moreover, the field located in the left-hand side of illustration is formed in the 3rd ink room 17 in which the differential pressure regulating valve which consists of a film valve 52 and spring 50 grade is held.
[0024] The free passage passage 18 which connects the between the 3rd ink room 16 and near the base 2A of the body 2 of a container, and introduces the ink of the 1st ink room 11 into the 3rd ink room 16 is formed in the field corresponding to the 3rd ink room 16 of the above-mentioned 1st ink room 11. The rectangular field where the perimeter was surrounded with the wall 19 is formed in the lower part of the above-mentioned free passage passage 18, and the free passage openings 19A and 19B are formed in the lower part and top face at the above-mentioned wall 19, respectively.
[0025] The above-mentioned free passage passage 18 forms groove crevice 18A in the front face (the field of the opposite side is hereafter called "front face of the body 2 of a container" the opening side of the body 2 of a container) of the body 2 of a container, and is formed by closing this crevice 18A with the film (not shown) of air barrier property.

[0026] And the upper part is open for free passage with the 3rd ink room 16 through the free passage opening 47, opening (not shown) is formed in the field of the rectangle surrounded with the lower wall 19, and the above-mentioned free passage passage 18 is open for free passage with the 1st ink room 11. By this, it is open for free passage through the 1st ink room 11, a buffer room, and the free passage passage 18, the ink of the 1st ink room 11 is introduced into the 3rd ink room 16, and it gets.
[0027] Moreover, the ink inlet 20 used in case ink is poured into the 1st ink room 11 is formed in the part which counters the free passage passage 18 at base 2A of the body 2 of a container. Furthermore, near the above-mentioned ink inlet 20, the air exhaust port 21 which discharges air in the case of ink impregnation is formed.
[0028] The wall 22 which separates predetermined spacing between top-face 14A of a frame 14, and is prolonged in a longitudinal direction is formed in the above-mentioned 3rd ink room 17. Moreover, the above-mentioned 3rd ink room 17 is divided with the wall 24 which presents the approximate circle arc which followed the above-mentioned wall 22, and the part surrounded by the above-mentioned wall 24 has become the field in which the differential-pressure-regulating-valve hold room 33 and the filter hold room 34 are formed.
[0029] Furthermore, while forming the differential-pressure-regulating-valve hold room 33 in the front-face side of the thickness direction of the field surrounded with the wall 24 of the above-mentioned approximate circle arc, and the field which counters, 2 ****s is carried out in the thickness direction with the wall 25 so that the filter hold room 34 may be formed in an opening side. The filter attachment section 31 of the cartridge to which joining of the filter 55 is carried out, and it fixes a filter 55 is formed in the interior of the above-mentioned filter hold room 34. Ink circulation opening 25A which leads the ink which passed the filter 55 to the differential-pressure-regulating-valve hold room 33 is prepared in the above-mentioned wall 25.
[0030] The partition wall 26 equipped with free passage opening 26A between walls 10 is formed in the lower part of the wall 24 of the above-mentioned approximate circle arc, and the downstream (left-hand side in drawing 4) is formed in the 4th ink room 23 from this wall 26. Moreover, between the wall 24 of the above-mentioned approximate circle arc, and a frame 14, the partition wall 27 prolonged in a lengthwise direction in preparation for the lower part in free passage opening 27A is established, and ink passage 28A is formed.
[0031] Moreover, while following the upper limit section of the above-mentioned wall 27, the wall 30 of the shape of radii formed so that it might connect with the wall 24 and wall 22 of an approximate circle arc is formed. And the field surrounded by the radii wall 30 of the above is formed in the ink circulation space 9.
[0032] And ranging over the wall 30 of the shape of radii which forms the above-mentioned ink circulation space 9, the through hole 29 of the configuration which connected the great circle and the small circle is formed. And the great-circle side of the above-mentioned through hole 29 is open for free passage in the upper part of ink passage 28A, and the small-circle side of a through hole 29 is open for free passage in the upper part of the filter hold room 34 through free passage opening 24A prepared in the point of the wall 24 of an approximate circle arc. Thereby, ink passage 28A and the filter hold room 34 are open for free passage through the above-mentioned through hole 29.
[0033] And the ink which passed the free passage openings 15A, 26A, and 27A from the

3rd ink room 16, and flowed into ink passage 28A passes through the ink circulation space 9, and flows into the great-circle side of a through hole 29. Subsequently, the ink which flowed into the through hole 29 flows into the filter hold room 34 through free passage opening 24A from the small-circle side of a through hole 29. [0034] Here, the stirring member 7 which the direction of the ink which passed free passage opening 15A is changed to the part of the downstream of free passage opening 15A to which ink flows toward the 3rd ink room 17 of the downstream from the 3rd ink room 16 of the upstream, and stirs ink into it is formed.

[0035] The above-mentioned stirring member 7 and its circumference structure are explained in detail using drawing 5 which is an enlarged drawing. The above-mentioned free passage opening 15A is formed in the lower limit section of a wall 15 which divides the 3rd ink room 16 and the 3rd ink room 17, and the ink of the 3rd ink room 16 flows to the 3rd ink room 17 in accordance with the wall 10 which forms the bottom of the 3rd ink room 16 and the 3rd ink room 17. From opening of the upstream, opening area is formed so that it may become small, and it raises the rate of flow of the ink which flows free passage opening 15A, and the opening of the downstream deals in the above-mentioned free passage opening 15A.

[0036] And the above-mentioned stirring member 7 is projected and formed in the location of the downstream from the above-mentioned free passage opening 15A of the wall 10 which forms the bottom of the 3rd ink room 17. Acclivity side 7A the flow of the ink which passed free passage opening 15A is made to go to the part which meets downstream opening of free passage opening 15A up is formed in the above-mentioned stirring member 7. The ink which flowed free passage opening 15A and flowed into the 3rd ink room 17 by this flows toward a top from the bottom.

[0037] Gradually [top], as for the above-mentioned inclined plane 7A, whenever [tilt-angle] is formed so that it may become large. Thereby, the ink which flowed up along with inclined plane 7A may have comes to generate a vortex in the 3rd ink room 17.

[0038] On the other hand, the lower part and the ink feed hopper 4 of the above-mentioned differential-pressure-regulating-valve hold room 33 are opened for free passage by the passage which consists of wrap air blocking film (not shown) the groove crevice 35 formed in the front-face side, and this crevice 35. Thereby, the ink which flowed into the filter hold room 34 is filtered with a filter 55, passes through hole 25A, and flows to the ink feed hopper 4 from the passage formed through the differential-pressure-regulating-valve hold room 33 in a crevice 35.

[0039] On the other hand, the rill 36 which moves in a zigzag direction so that passage resistance may become high if possible, and the broad slot 37 which is open for free passage to the above-mentioned rill 36, and surrounds the differential-pressure-regulating-valve hold room 33 and the perimeter of a rill 36 are formed in the front face of the body 2 of a container. Moreover, the rectangle-like crevice 38 is formed in the field corresponding to the 3rd ink room 16 in the front face of the above-mentioned body 2 of a container.

[0040] In the rectangle crevice 38 of the above, the frame part 39 and the rib 40 are formed in the condition of falling by one step. And the inside of the rectangle crevice 38 of the above is formed in the atmospheric-air draught chamber which is open for free passage to atmospheric air through a rill 36 and a slot 37 by stretching the breathable film (not shown) which has ** ink nature in these.

[0041] A through hole 41 is drilled by the inner side of the above-mentioned crevice 38, and the long and slender field 43 divided with the wall 42 in the 3rd ink room 16 is open for free passage. Moreover, in the field by the side of a front face, the rill 36 is open for free passage from the breathable film of the above-mentioned crevice 38. furthermore, the above -- the through hole 44 is drilled in the through hole 41 of the long and slender field 43, and the edge of the opposite side. This through hole 44 is opened for free passage by the bulb hold room 8 which is an atmospheric-air open-valve room through the through hole 46 drilled so that it might be open for free passage with the slot 45 for a free passage formed in the front-face side of the body 2 of a container, and the above-mentioned slot 45.
[0042] That cartridge insertion side (this example under) is opened wide, the bulb hold room 8 is formed possible [penetration of the piece of discernment and bulb actuation lever which were formed in the body of a recording apparatus], and the atmospheric-air open valve which opens by penetration of an actuation lever and always maintains an open-valve condition is held in the upper part.
[0043] drawing 6 -- the above-mentioned filter hold room 34 and a differential-pressure-regulating-valve hold room -- about 33 cross-section structure is shown. In addition, the right-hand side of illustration is a front-face side of the body 2 of a container with the differential-pressure-regulating-valve hold room 33. It is constituted with a spring 50 and the ingredient in which elastic deformation, such as an elastomer, is possible by the above-mentioned differential-pressure-regulating-valve hold room 33, and the film valve 52 which equipped the core with the through hole 51 is held in it. That perimeter has annular heavy-gage part 52A, and the above-mentioned film valve 52 is being fixed to the body 2 of a container through the frame part 54 formed in this heavy-gage part 52A at one. Moreover, an end is contacted by spring receptacle section 52B of a film valve 52, and the above-mentioned spring 50 is contacted and supported by spring receptacle section 53A of the lid 53 with which the other end covers with the lid of the differential-pressure-regulating-valve hold room 33.
[0044] In addition, in drawing, 56 and 57 are air blocking film stuck on the front-face [of the body 2 of a container], and effective area side. Joining of the air blocking film 56 is carried out to walls 10, 15, 22, 24, 30, and 42, a frame 14, and the partition walls 26, 27, and 32.
[0045] The ink which passed ink circulation opening 25A through the filter 55 by such configuration has circulation prevented by the film valve 52. If the pressure of the ink feed hopper 4 declines in this condition, a film valve 52 will resist the energization force of a spring 50 with that negative pressure, it will separate from valve seat section 25B, and ink will flow into the ink feed hopper 4 via the passage which passed through the through hole 51 and was formed in the crevice 35.
[0046] If the ink pressure of the ink feed hopper 4 rises to a predetermined value, a film valve 52 will be ****(ed) by valve seat section 25B according to the energization force of a spring 50, and circulation of ink will be intercepted. Ink can be discharged from the ink feed hopper 4, maintaining fixed negative pressure by repeating such actuation.
[0047] Drawing 7 shows the cross-section structure of the bulb hold room 8 for an atmospheric-air free passage. A through hole 60 is drilled by the wall which divides the above-mentioned bulb hold room 8, and in the perimeter, the press member 61 constituted by elastic members, such as rubber, here is supported by the body 2 of a

container, and is inserted movable. At the tip by the side of penetration of the above-mentioned press member 61, the valve element 65 which was supported by the elastic member 62 and was always energized by the through hole 60 is arranged. In this example, as for the above-mentioned elastic member 62, the flat spring by which the lower limit was fixed by the projection 63 and the center section was regulated by the projection 64 is used.

[0048] On the other hand, the arm 66 is arranged in the opposite side of the above-mentioned press member 61. The above-mentioned arm 66 is being fixed to the body 2 of a container through rotation supporting-point 66A to which the path-of-insertion side (this example lower limit) of that cartridge 1 is located inside the actuation lever 70 mentioned later. Moreover, that drawing side (this example upper part side) has projected the above-mentioned arm 66 aslant to the admission passage of the actuation lever 70. Heights 66B which oppresses the press member 61 is formed at the tip of the above-mentioned arm 66. By such configuration, the through-hole 67 prepared in the upper part of the 1st ink room 11 is connected to the crevice 38 for an atmospheric-air free passage through a through hole 60 at the time of valve opening of a valve element 65.

[0049] As shown in drawing 8 , when the cartridge holder 71 with which the actuation lever 70 was set up by the inferior surface of tongue is loaded with a cartridge 1, the arm 66 toward which the actuation lever 70 inclined is contacted, and heights (press member) 61 are made to incline in a valve element 65 side with pushing of a cartridge 1 by such configuration. Thereby, a valve element 65 separates and makes atmospheric air open the crevice 38 for an atmospheric-air free passage wide through the through hole 46 mentioned above, a slot 45, a through hole 44, a field 43, and a through hole 41 from a through hole 60.

[0050] Moreover, since an arm 66 loses support of the actuation lever 70 when drawn out from the cartridge holder 71, a valve element 65 blocks a through hole 60 according to the energization force of a flat spring 62, and a free passage with an ink hold field and atmospheric air is severed. In addition, in drawing, a sign 72 shows the ink supply needle which supplies ink to the ink jet recording head 73.

[0051] Where all the members, such as a valve, are included in the body 2 of a container as mentioned above, air blocking film is stuck on a front face so that the field in which the crevice is formed at least may be covered. Thereby, the capillary which serves as an atmospheric-air free passage way with a crevice and a film is formed in a front-face side.

[0052] Moreover, air blocking film 56 is stuck on opening of the body 2 of a container by heat joining etc. so that it may become in airtight to each wall mentioned above. And a lid 3 is put from moreover and joining etc. is fixed. The closure is carried out so that the field divided with each wall may be open for free passage through free passage opening or opening by this.

[0053] Furthermore, the closure also of the opening side of the bulb hold room 8 is similarly carried out by heat joining by air-blocking-film 56', and a cartridge 1 is made to it. Thus, by taking the structure which closes an ink hold field by air-blocking-film 56 grade, it becomes possible it not only can to fabricate the body 2 of a container easily, but to absorb rocking of the ink resulting from reciprocation of carriage according to film deformation of air blocking film 56, and to maintain an ink pressure as uniformly as possible.

[0054] Subsequently, while inserting an ink filling pipe in the ink inlet 20, where the air

exhaust port 21 is opened wide, the fully deaerated ink is poured in. After impregnation is completed, the ink inlet 20 and the air exhaust port 21 are closed with a film or a plug.
[0055] Thus, since a free passage with atmospheric air is severed by the valve etc. and the constituted cartridge 1 is saved, whenever [degassing / of ink] is fully maintained.
[0056] And in case the cartridge holder 71 is loaded with a cartridge 1, as advanced and mentioned above to the location where the ink feed hopper 4 is inserted in the ink supply needle 72, a through hole 60 is wide opened with the actuation lever 70, an ink hold field is open for free passage to atmospheric air, and the bulb of the ink feed hopper 4 is also opened with the ink supply needle 72.
[0057] The cartridge holder 71 is normally equipped with a cartridge 1, and if printing is performed and ink is consumed by the recording head 73, since the pressure of the ink feed hopper 4 will fall below to default value, a film valve 52 is opened wide as mentioned above. Moreover, if the pressure of the ink feed hopper 4 rises, a film valve 52 will close the valve. Thus, the ink maintained by predetermined negative pressure flows into a recording head 73.
[0058] If consumption of the ink in a recording head 73 advances, the ink of the 1st ink room 11 will flow into the 3rd ink room 16 through the free passage passage 18. The air bubbles which flowed in here go up by buoyancy, and only ink flows into the 3rd ink room 17 via lower free passage opening 15A.
[0059] At this time, as shown in drawing 9 , the ink which passed free passage opening 15A from the 3rd ink room 16 flows along with inclined plane 7A of the stirring member 7, raising the rate of flow, changes a direction and flows toward the upper part. And flow is interrupted with the wall 24 of the shape of radii formed in the 3rd ink room 17, a vortex is generated in the 3rd ink room 17, and ink is stirred.
[0060] And the ink in the stirred 3rd ink room 17 passes free passage opening 26A of a wall 26 which divides the filter hold room 34, passes along the 4th ink room 23, and flows into ink passage 28A.
[0061] The ink which flowed ink passage 28A flows into the ink circulation space 9. The ink which passed through the above-mentioned ink circulation space 9 flows a small-circle side from the great-circle side of a through hole 29, passes free passage opening 24A, and flows into the upper part of the filter hold room 34.
[0062] Subsequently, the ink which flowed into the filter hold room 34 flows into the ink feed hopper 4 with predetermined negative pressure by the switching action of a film valve 52, as it is filtered with a filter 55, through hole 25A is passed, and it flows into the differential-pressure-regulating-valve hold room 33 and being mentioned above.
[0063] Here, since atmospheric air is open for free passage through the atmospheric-air free passage way 13, 13', and a through-hole 67 and the 1st ink room 11 is maintained by atmospheric pressure, it is not negative pressure's occurring and checking the flow of ink.
[0064] Thus, in the above-mentioned cartridge 1, since the stirring member 7 which the direction of ink is changed from the 3rd ink room 16 to the downstream of free passage opening 15A to which ink flows toward the 3rd ink room 17, and stirs ink is formed, in case the above-mentioned free passage opening 15A is flowed, the ink in a cartridge 1 is stirred automatically. Therefore, sedimentation of ink can be effectively prevented with simple structure like before, without carrying out complication and cost rise of the structure of an ink stores dept. or the recording device itself.
[0065] Drawing 10 and drawing 11 show the gestalt of operation of the 2nd of this

invention. In this example, the inclined plane 32 to the migration direction (the arrow head B of illustration) of carriage 75 is formed in the base of the 3rd ink room 17. As for the above-mentioned inclined plane 32, the bottom is formed so that whenever [tilt-angle] may become gradually large.
[0066] By this, the ink which rocks the inside of the 3rd ink room 17 in the migration direction of carriage 75 with both-way migration of carriage 75 produces the flow to the vertical direction along the above-mentioned inclined plane 32, and serves as an eddy, and it stirs automatically. Moreover, since it is formed in the base of the 3rd ink room 17, the above-mentioned inclined plane 32 is effectively stirred, even if the ink in the 3rd ink room 17 runs short. Except it, it is the same as that of the gestalt of the above-mentioned implementation, and the same sign is given to the same part. Also by this cartridge, the same operation effectiveness as the gestalt of the above-mentioned implementation is done so.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view showing the ink jet type recording device with which this invention is applied.
[Drawing 2] It is the decomposition perspective view showing the gestalt of 1 operation of the ink cartridge to which this invention was applied.
[Drawing 3] It is the decomposition perspective view showing the above-mentioned ink cartridge.
[Drawing 4] It is drawing showing the condition of opening of the body of a container.
[Drawing 5] It is the enlarged drawing showing the circumference structure of a stirring member.
[Drawing 6] It is the enlarged drawing showing the cross-section structure of a negative pressure generating means hold room.
[Drawing 7] It is the enlarged drawing showing the cross-section structure of the bulb hold room for an atmospheric-air free passage.
[Drawing 8] It is drawing showing an example of a cartridge holder.
[Drawing 9] It is the explanatory view showing an operation of the above-mentioned ink cartridge.
[Drawing 10] It is drawing showing the ink cartridge of the gestalt of operation of the 2nd of this invention.
[Drawing 11] It is the A-A sectional view showing the above-mentioned ink cartridge.
[Description of Notations]
1 Ink Cartridge
2 Body of Container
3 Lid
4 Ink Feed Hopper
5 Six Stop member
7 Stirring Member
8 Bulb Hold Room
9 Ink Circulation Space

10 Wall
11 1st Ink Room
12 Wall
13 Atmospheric-Air Free Passage Way
14 Frame
14A Top face
15 Wall
15A Free passage opening
16 2nd Ink Room
17 3rd Ink Room
18 Free Passage Passage
18A Crevice
19 Wall
19A, 19B Free passage opening
20 Ink Inlet
21 Air Exhaust Port
22 Wall
23 4th Ink Room
24 25 Wall
25A Ink circulation opening
25B Valve seat section
26 27 Partition wall
26A, 27A Free passage opening
28 Ink Passage
29 Through Hole
30 Wall
30A Crevice
31 Filter Attachment Section
32 Inclined Plane
33 Differential-Pressure-Regulating-Valve Hold Room
34 Filter Hold Room
35 Crevice
36 Rill
37 Slot
38 Crevice
39 Frame Part
40 Rib
41 Through Hole
45 Slot
46 Through Hole
47 Free Passage Opening
50 Spring
51 Through Hole
52 Film Valve
52A Heavy-gage part
52B, 53A Spring receptacle section

53 Lid
54 Frame Part
55 Filter
56, 56', 57 air blocking film
60 Through Hole
61 Press Member
62 Elastic Member
63 64 Projection
65 Valve Element
66 Arm
66A Rotation supporting point
66B Heights
67 Through-hole
70 Actuation Lever
71 Cartridge Holder
72 Ink Supply Needle
73 Recording Head
75 Carriage
76 Recording Paper
77 Timing Belt
78 Guide Bar
79 Stepping Motor

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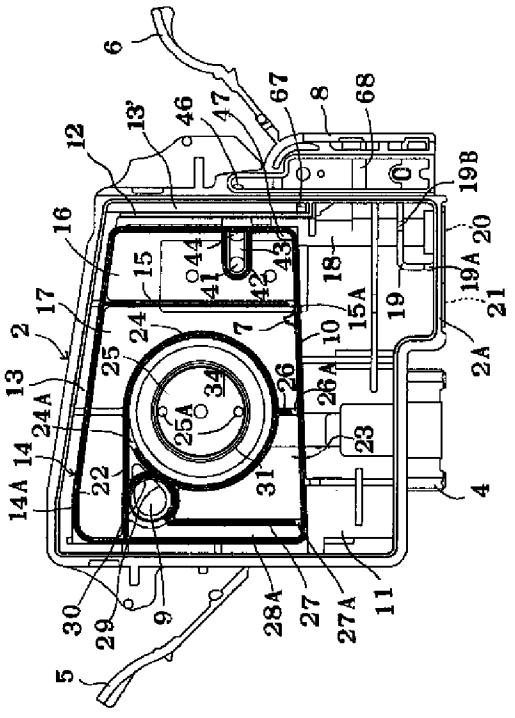
最終頁に続く

(54)【発明の名称】　インク貯留タンク

(57)【要約】
【課題】流路構造や形状だけで内部のインクを攪拌できてヘッド構造の複雑化やコストアップをほとんどすることなくインクの沈降を効果的に防止しうるインク貯留タンクを提供する。
【解決手段】印刷信号に対応してインク滴を吐出する記録ヘッドに供給されるインクを貯留するインクカートリッジ１であって、インクが流れる連通口１５Ａを備え、上記連通口１５Ａの下流側に、連通口１５Ａを流れるインクの方向を変化させてインクを攪拌する攪拌部材７を設けたことにより、上記連通口１５Ａを流れる際にカートリッジ１内のインクが自動的に攪拌される。したがって、従来のように、カートリッジ１や記録装置自体の構造の複雑化やコストアップをすることなく、簡易な構造でインクの沈降を効果的に防止できる。



【特許請求の範囲】
【請求項１】　印刷信号に対応してインク滴を吐出する記録ヘッドに供給されるインクを貯留するインク貯留タンクであって、インクが流れる流路部を備え、上記流路部の近傍に、流路部を流れるインクの方向を変化させてインクを攪拌する攪拌手段が設けられていることを特徴とするインク貯留タンク。
【請求項２】　複数のインク室を備え、上流側のインク室から下流側のインク室に連通する流路部の近傍に攪拌手段が設けられている請求項１記載のインク貯留タンク。
【請求項３】　上記攪拌手段が流路部の下流側に設けられている請求項２記載のインク貯留タンク。
【請求項４】　上記流路部の下流側開口面積が上流側開口面積より小さくなるよう設定されている請求項２または３記載のインク貯留タンク。
【請求項５】　上記攪拌手段が、使用状態のインク貯留タンクの下から上に向かってインクが流れるよう形成されている請求項２～４のいずれか一項に記載のインク貯留タンク。
【請求項６】　上記攪拌手段が、下流側のインク室でインクの渦流を発生させるよう形成されている請求項２～４のいずれか一項に記載のインク貯留タンク。
【請求項７】　記録媒体に沿って往復移動するキャリッジに搭載され、印刷信号に対応してインク滴を吐出する記録ヘッドに供給されるインクを貯留するインク貯留タンクであって、インクを貯留するインク室内に、キャリッジの移動方向に対する傾斜面が形成されていることを特徴とするインク貯留タンク。
【請求項８】　上記傾斜面がインク室の底面に形成されている請求項７記載のインク貯留タンク。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、印刷信号に対応してインク滴を吐出する記録ヘッドに供給されるインクを貯留するインク貯留タンクに関するものである。
【０００２】
【従来の技術】一般に、インクジェット記録装置に用いられるインクは、溶媒中に顔料等の分散粒子を均一に分散させて混合したものが用いられている。このようなインクは、長期間にわたって印刷が行われず、インク貯蔵部内においてインクが循環しない状態で置かれていると、溶媒と分散粒子との比重差で分散粒子が下降して沈殿する性質がある。
【０００３】このような分散粒子の沈殿に対し、濃度を一定に維持するために攪拌装置を設けることが検討されてきた。例えば、特開平５－２２９１４０号公報に開示されたインクジェット式印写装置では、粘度の高いインクや比重の大きい顔料を含んだインクを効果的に攪拌するために、インク貯蔵部内に攪拌翼およびそれに回転を付与する回転軸を設け、インク貯蔵部外から駆動モータによって回転させることが行なわれている。
【０００４】ところが、上記装置では、インク貯蔵部に攪拌翼や回転軸を設ける構造が採られていることから、インク貯蔵部が大型化するとともに、攪拌翼や回転軸の駆動機構が必要で装置自体も複雑になるという問題がある。また、インク貯蔵部のインク残量が一定以下になった場合、攪拌翼の機能が半減してしまい、十分な攪拌効果が期待できないという問題もある。
【０００５】このような問題を解消するものとして、例えば、特開平１０－２８６９６２号公報に開示された静電式インクジェット記録装置が考案されている。この記録装置では、インク貯蔵部の内部に対向一対の攪拌電極を配置し、一定時間、交流電圧を印加して極性を変更するものである。これにより、インク貯蔵部内で帯電トナーが沈殿した場合でも、攪拌電極の極性の変化で沈殿した帯電トナーが低電圧側に繰り返し移動し、沈殿した帯電トナーに攪拌作用が生じて、濃度一定のインクとなる。
【発明が解決しようとする課題】しかしながら、上記インクジェット式記録装置でも、インク貯蔵部内に一対の攪拌電極を設け、インク貯蔵部の外部から攪拌電極に交流電圧を印加して極性を変更する制御コントローラが必要である。このため、インク貯蔵部および装置自体の構造が複雑化し、装置やインク貯蔵部自体のコストアップが避けられず、特に交換可能のインクカートリッジには不向きであった。
【０００６】本発明は、このような事情に鑑みなされたもので、流路構造や形状だけで内部のインクを攪拌できてヘッド構造の複雑化やコストアップをほとんどすることなくインクの沈降を効果的に防止しうるインク貯留タンクの提供を目的とする。
【０００７】
【課題を解決するための手段】上記目的を達成するため、本発明のインク貯留タンクは、印刷信号に対応してインク滴を吐出する記録ヘッドに供給されるインクを貯留するインク貯留タンクであって、インクが流れる流路部を備え、上記流路部の近傍に、流路部を流れるインクの方向を変化させてインクを攪拌する攪拌手段が設けられていることを第１の要旨とする。
【０００８】すなわち、上記インク貯留タンクは、インクが流れる流路部を備え、上記流路部の近傍に、流路部を流れるインクの方向を変化させてインクを攪拌する攪拌手段が設けられているため、上記流路部を流れる際にインク貯留タンク内のインクが自動的に攪拌される。したがって、従来のように、インク貯蔵部や記録装置自体の構造の複雑化やコストアップをすることなく、簡易な構造でインクの沈降を効果的に防止できる。
【０００９】本発明のインク貯留タンクにおいて、複数のインク室を備え、上流側のインク室から下流側のイン

ク室に連通する流路部の近傍に攪拌手段が設けられている場合や、上記攪拌手段が流路部の下流側に設けられている場合には、複数のインク室を備えたインク貯留タンクにおいてインクの沈降を効果的に防止できる。

【００１０】本発明のインク貯留タンクにおいて、上記流路部の下流側開口面積が上流側開口面積より小さくなるよう設定されている場合には、流路部を通過するインクの流速が速くなり、攪拌効果が向上する。

【００１１】本発明のインク貯留タンクにおいて、上記攪拌手段が、使用状態のインク貯留タンクの下から上に向かってインクが流れるよう形成されている場合、あるいは、上記攪拌手段が、下流側のインク室でインクの渦流を発生させるよう形成されている場合には、簡易な構造でインクの沈降を効果的に防止できる。

【００１２】また、本発明のインク貯留タンクは、記録媒体に沿って往復移動するキャリッジに搭載され、印刷信号に対応してインク滴を吐出する記録ヘッドに供給されるインクを貯留するインク貯留タンクであって、インクを貯留するインク室内に、キャリッジの移動方向に対する傾斜面が形成されていることを第２の要旨とする。

【００１３】すなわち、上記インク貯留タンクは、インクを貯留するインク室内に、キャリッジの移動方向に対する傾斜面が形成されているため、キャリッジの往復移動に伴ってインク室内をキャリッジの移動方向に揺動するインクが、上記傾斜面に沿って上下方向への流れを生じ、自動的に攪拌される。したがって、従来のように、インク貯蔵部や記録装置自体の構造の複雑化やコストアップをすることなく、簡易な構造でインクの沈降を効果的に防止できる。

【００１４】本発明のインク貯留タンクにおいて、上記傾斜面がインク室の底面に形成されている場合には、インク室内のインクが残り少なくなっても効果的に攪拌される。

【００１５】

【発明の実施の形態】つぎに、本発明の実施の形態を詳しく説明する。

【００１６】図１は、本発明のインク貯留タンクが適用されるインクジェット式記録装置の周辺構造の一例を示す図である。この装置は、本発明が適用されたインクカートリッジ（以下「カートリッジ」という）１が搭載されるとともに、記録ヘッド７３が取り付けられたキャリッジ７５を備えている。

【００１７】上記キャリッジ７５は、タイミングベルト７７を介してステッピングモータ７９に接続され、ガイドバー７８に案内されて記録紙７６の紙幅方向（主走査方向）に往復移動するようになっている。上記キャリッジ７５は、上部に開放する箱型を呈し、記録紙７６と対向する面（この例では下面）に、記録ヘッド７３のノズル面が露呈するよう取り付けられるとともに、カートリッジ１が搭載されるようになっている。

【００１８】そして、上記記録ヘッド７３にカートリッジ１からインクが供給され、キャリッジ７５を移動させながら記録紙７６上面にインク滴を吐出させて記録紙７６に画像や文字をドットマトリックスにより印刷するようになっている。

【００１９】図２および図３は、上記カートリッジ１を示す分解斜視図である。このカートリッジ１は、一方の面（図２における右側面）が開口した扁平な矩形状の容器本体２と、上記開口を封止する蓋体３とを備えている。上記容器本体２および蓋体３は、いずれも合成樹脂から形成されている。

【００２０】図４は、上記容器本体２を開口側から見た状態を示す。上記容器本体２の挿入方向の先端面（この例では下面）には、インク供給口４が形成され、図４における左右の側面にはそれぞれ係止部材５，６が容器本体２と一体的に形成されている。上記インク供給口４にはインク供給針の挿通により開弁する弁体（図示せず）が収容されている。なお、図２および図３において、２Ｂはインク供給口４側の係止部材５の下部に設けられた記憶手段（図示せず）を収容する凹部である。

【００２１】上記容器本体２の内部は、略水平方向でインク供給口４の側に若干下り傾斜となるように延びる壁１０により上下に２分割されている。上記壁１０より下側の領域は、インクが収容される第１インク室１１に形成されている。

【００２２】上記壁１０より上側の領域は、壁１０を含む枠状部１４により容器本体２の内壁面と略一定の隙間を持たせて区画されている。上記枠状部１４と容器本体２の内壁面との間に形成された隙間と、上記枠状部１４のバルブ収容室８側に設けられた壁１２とにより、通孔６７を介して第１インク室１１を大気と連通させる大気連通路１３，１３’が形成されている。上記壁１２と容器本体２の外周壁とに蓋体３が融着されて大気連通路１３’が形成されている。

【００２３】上記枠状部１４の内部は、底部にインクが流通する連通口１５Ａが形成された縦方向に延びる壁１５により左右に分割されている。そして、上記壁１５で分割された図示の右側に位置する領域は、第１インク室１１のインクを吸い上げて一時貯留する第３インク室１６に形成されている。また、図示の左側に位置する領域は、膜弁５２やばね５０等から構成される差圧弁が収容される第３インク室１７に形成されている。

【００２４】上記第１インク室１１の第３インク室１６に対応する領域には、第３インク室１６と容器本体２の底面２Ａ近傍との間を接続して第１インク室１１のインクを第３インク室１６に導入する連通流路１８が形成されている。上記連通流路１８の下部には、周囲が壁１９で囲まれた矩形の領域が形成され、上記壁１９には、その下部と上面とにそれぞれ連通口１９Ａ，１９Ｂが形成されている。

【００２５】上記連通流路１８は、容器本体２の表面（以下、容器本体２の開口側と反対側の面を「容器本体２の表面」という）に溝状の凹部１８Ａを形成し、この凹部１８Ａを遮気性のフィルム（図示せず）で封止することにより形成されている。

【００２６】そして、上記連通流路１８は、その上部が連通口４７を介して第３インク室１６と連通し、下部の壁１９で囲まれた矩形の領域内に開口部（図示せず）が形成されて第１インク室１１と連通している。これにより、第１インク室１１とバッファ室と連通流路１８を介して連通され、第１インク室１１のインクが第３インク室１６に導入されうるようになっている。

【００２７】また、容器本体２の底面２Ａには、その連通流路１８に対向する箇所に、第１インク室１１にインクを注入する際に用いられるインク注入口２０が形成されている。さらに、上記インク注入口２０の近傍には、インク注入の際に空気を排出する空気排出口２１が形成されている。

【００２８】上記第３インク室１７には、枠状部１４の上面１４Ａとの間で所定間隔を隔てて横方向に延びる壁２２が形成されている。また、上記第３インク室１７は、上記壁２２に連続した略円弧状を呈する壁２４によって区画され、上記壁２４に囲まれた部分が、差圧弁収容室３３とフィルタ収容室３４が形成される領域になっている。

【００２９】さらに、上記略円弧状の壁２４で囲まれた領域と対向する領域の、厚み方向の表面側に差圧弁収容室３３を形成するとともに、開口側にフィルタ収容室３４を形成するよう壁２５により厚み方向に２分割されている。上記フィルタ収容室３４の内部には、フィルタ５５が溶着されてフィルタ５５を固定する筒形のフィルタ取付部３１が形成されている。上記壁２５には、フィルタ５５を通過したインクを差圧弁収容室３３に導くインク流通口２５Ａが設けられている。

【００３０】上記略円弧状の壁２４の下部には、壁１０との間に連通口２６Ａを備えた区画壁２６が形成され、この壁２６より下流側（図４における左側）が第４インク室２３に形成されている。また、上記略円弧状の壁２４と枠状部１４との間には下部に連通口２７Ａを備えて縦方向に延びる区画壁２７が設けられ、インク流路２８Ａが形成されている。

【００３１】また、上記壁２７の上端部に連続するとともに、略円弧状の壁２４および壁２２に接続されるよう形成された円弧状の壁３０が形成されている。そして、上記円弧状の壁３０に囲まれた領域が、インク流通空間９に形成されている。

【００３２】そして、上記インク流通空間９を形成している円弧状の壁３０にまたがって、大円と小円を連結した形状の貫通穴２９が形成されている。そして、上記貫通穴２９の大円側がインク流路２８Ａの上部に連通し、貫通穴２９の小円側が、略円弧状の壁２４の先端部に設けられた連通口２４Ａを介してフィルタ収容室３４の上部に連通している。これにより、上記貫通穴２９を介してインク流路２８Ａとフィルタ収容室３４とが連通している。

【００３３】そして、第３インク室１６から連通口１５Ａ，２６Ａ，２７Ａを通過してインク流路２８Ａに流入したインクは、インク流通空間９を通過して貫通穴２９の大円側に流れ込む。ついで、貫通穴２９に流入したインクは、貫通穴２９の小円側から連通口２４Ａを介してフィルタ収容室３４に流れ込むようになっている。

【００３４】ここで、上流側の第３インク室１６から下流側の第３インク室１７に向かってインクが流れる連通口１５Ａの下流側の部分に、連通口１５Ａを通過したインクの方向を変化させてインクを攪拌する攪拌部材７が設けられている。

【００３５】上記攪拌部材７およびその周辺構造について、拡大図である図５を用いて詳しく説明する。上記連通口１５Ａは、第３インク室１６と第３インク室１７を仕切る壁１５の下端部に形成され、第３インク室１６のインクは、第３インク室１６および第３インク室１７の底を形成する壁１０に沿って第３インク室１７へ流れるようになっている。上記連通口１５Ａは、上流側の開口より下流側の開口の方が開口面積が小さくなるように形成され、連通口１５Ａを流れるインクの流速を上昇させうるようになっている。

【００３６】そして、上記攪拌部材７は、第３インク室１７の底を形成する壁１０の、上記連通口１５Ａより下流側の位置に突出形成されている。上記攪拌部材７には、連通口１５Ａの下流側開口に対面する部分に、連通口１５Ａを通過したインクの流れを上方に向かうようにする上り傾斜面７Ａが形成されている。これにより、連通口１５Ａを流れて第３インク室１７に流入したインクが下から上に向かって流れるようになっている。

【００３７】上記傾斜面７Ａは、上側ほど徐々に傾斜角度が大きくなるよう形成されている。これにより、傾斜面７Ａに沿って上方に流れたインクが、第３インク室１７内で渦流を発生しうるようになっている。

【００３８】一方、上記差圧弁収容室３３の下部とインク供給口４とは、表面側に形成された溝状の凹部３５と、この凹部３５を覆う遮気性フィルム（図示せず）とからなる流路により連通されている。これにより、フィルタ収容室３４に流入したインクは、フィルタ５５でろ過されて貫通穴２５Ａを通過し、差圧弁収容室３３を通って凹部３５で形成される流路からインク供給口４に流れるようになっている。

【００３９】一方、容器本体２の表面には、なるべく流路抵抗が高くなるよう蛇行する細溝３６と、上記細溝３６に連通し、差圧弁収容室３３および細溝３６の周囲を囲む幅広の溝３７とが形成されている。また、上記容器

本体２の表面には、その第３インク室１６に対応する領域に矩形状の凹部３８が形成されている。

【００４０】上記矩形状の凹部３８内には、一段下がりの状態で枠部３９およびリブ４０が形成されている。そして、これらに發インク性を有する通気性フィルム（図示せず）が張設されることにより、上記矩形状の凹部３８内が、細溝３６および溝３７を介して大気に連通する大気通気室に形成されている。

【００４１】上記凹部３８の奥面には貫通穴４１が穿設され、第３インク室１６内の壁４２で区画された細長い領域４３に連通されている。また、上記凹部３８の通気性フィルムよりも表面側の領域には細溝３６が連通している。さらに、上記細長い領域４３の貫通穴４１と反対側の端部には貫通穴４４が穿設されている。この貫通穴４４は、容器本体２の表面側に形成された連通用の溝４５、および上記溝４５と連通するよう穿設された貫通穴４６を介して大気開放弁室であるバルブ収容室８に連通されている。

【００４２】バルブ収容室８は、そのカートリッジ挿入側（この実施例では下側）が開放されていて、記録装置本体に設けられた識別片およびバルブ作動杆が進入可能に形成され、上部に、作動杆の進入により開弁して常時開放弁状態を維持する大気開放弁が収容されている。

【００４３】図６は、前述のフィルタ収容室３４および差圧弁収容室３３近傍の断面構造を示す。なお、図示の右側が差圧弁収容室３３のある容器本体２の表面側である。上記差圧弁収容室３３には、バネ５０とエラストマー等の弾性変形可能な材料により構成され、中心に貫通穴５１を備えた膜弁５２が収容されている。上記膜弁５２はその周囲が環状の厚肉部５２Ａを有し、この厚肉部５２Ａに一体に形成された枠部５４を介して容器本体２に固定されている。また、上記バネ５０は、一端が膜弁５２のバネ受け部５２Ｂに当接され、他端が差圧弁収容室３３を蓋する蓋体５３のバネ受け部５３Ａに当接されて支持されている。

【００４４】なお、図において、５６，５７は容器本体２の表面側および開口面側に貼付された遮気性フィルムである。遮気性フィルム５６は、壁１０，１５，２２，２４，３０，４２，枠状部１４，区画壁２６，２７，３２と溶着されている。

【００４５】このような構成により、フィルタ５５を通ってインク流通口２５Ａを通過したインクは、膜弁５２によって流通を阻止される。この状態でインク供給口４の圧力が低下すると、その負圧により膜弁５２がバネ５０の付勢力に抗して弁座部２５Ｂから離れ、インクは貫通穴５１を通過して凹部３５で形成された流路を経由してインク供給口４に流れ込む。

【００４６】インク供給口４のインク圧力が所定の値に上昇すると、膜弁５２がバネ５０の付勢力によって弁座部２５Ｂに弾接され、インクの流通が遮断される。このような動作を繰り返すことにより一定の負圧を維持しながらインクをインク供給口４から排出することができる。

【００４７】図７は、大気連通用のバルブ収容室８の断面構造を示す。上記バルブ収容室８を区画する壁には貫通穴６０が穿設され、ここにゴム等の弾性部材により構成された押圧部材６１がその周囲を容器本体２に支持されて移動可能に挿入されている。上記押圧部材６１の進入側の先端には、弾性部材６２に支持されて貫通穴６０に常時付勢された弁体６５が配置されている。上記弾性部材６２は、この例では下端が突起６３で固定され、中央部が突起６４で規制された板バネが用いられている。

【００４８】一方、上記押圧部材６１の反対側には、アーム６６が配置されている。上記アーム６６は、そのカートリッジ１の挿入方向側（この例では下端）が、後述する作動杆７０より内側に位置する回動支点６６Ａを介して容器本体２に固定されている。また、上記アーム６６は、その引き抜き側（この例では上部側）が作動杆７０の進入路に斜めに突出している。上記アーム６６の先端には、押圧部材６１を弾圧する凸部６６Ｂが形成されている。このような構成により、弁体６５の開弁時に、第１インク室１１の上部に設けられた通孔６７が貫通穴６０を介して大気連通用の凹部３８に接続される。

【００４９】このような構成により、図８に示したように下面に作動杆７０が立設されたカートリッジホルダ７１にカートリッジ１が装填されると、作動杆７０が傾斜したアーム６６に当接し、カートリッジ１の押込みとともに凸部（押圧部材）６１を弁体６５の側に傾斜させる。これにより弁体６５が貫通穴６０から離れ、前述した貫通穴４６、溝４５、貫通穴４４、領域４３、貫通穴４１を介して大気連通用の凹部３８を大気に開放させる。

【００５０】また、カートリッジホルダ７１から引き抜かれた場合には、アーム６６が作動杆７０の支持を失うため、板バネ６２の付勢力により弁体６５が貫通穴６０を封鎖し、インク収容領域と大気との連通を断つ。なお、図において、符号７２はインクジェット記録ヘッド７３にインクを供給するインク供給針を示す。

【００５１】上記のように弁等の全ての部材が容器本体２に組み込まれた状態で、表面には、少なくとも凹部が形成されている領域を覆うように遮気性フィルムを貼付する。これにより、表面側には凹部とフィルムにより大気連通路となるキャピラリが形成される。

【００５２】また、容器本体２の開口部には、前述した各壁に対して気密的になるよう、遮気性フィルム５６が熱溶着等により貼着される。そして、そのうえから蓋体３をかぶせて溶着等により固定される。これにより、各壁によって区画された領域が連通口や開口を介してのみ連通するように封止される。

【００５３】さらに、バルブ収容室８の開口側も、同様

に熱溶着により遮気性フィルム５６’で封止され、カートリッジ１に仕上げられる。このようにインク収容領域を遮気性フィルム５６等により封止する構造を採ることにより、容器本体２を容易に成形できるばかりでなく、キャリッジの往復動に起因するインクの揺動を遮気性フィルム５６の膜変形により吸収してインク圧力をなるべく一定に維持することが可能となる。

【００５４】ついで、インク注入口２０にインク注入管を挿通するとともに、空気排出口２１を開放した状態で、十分に脱気したインクを注入する。注入が完了した後、インク注入口２０および空気排出口２１をフィルムや栓体で封止する。

【００５５】このように構成されたカートリッジ１は、弁等により大気との連通が断たれて保存されるため、インクの脱気度が十分に維持される。

【００５６】そして、カートリッジ１をカートリッジホルダ７１に装填する際、インク供給口４がインク供給針７２に挿通される位置まで進入し、前述したように作動杆７０により貫通穴６０が開放されてインク収容領域が大気に連通し、インク供給口４のバルブもインク供給針７２により開弁される。

【００５７】カートリッジ１がカートリッジホルダ７１に正常に装着され、印刷が行なわれて記録ヘッド７３によりインクが消費されると、インク供給口４の圧力が規定値以下に低下するため、前述のように膜弁５２が開放される。また、インク供給口４の圧力が上昇すると膜弁５２が閉弁する。このようにして、所定の負圧に維持されたインクが記録ヘッド７３に流れ込む。

【００５８】記録ヘッド７３でのインクの消費が進行すると、第１インク室１１のインクが連通流路１８を介して第３インク室１６に流れ込む。ここに流れ込んだ気泡は浮力により上昇し、インクだけが下部の連通口１５Ａを経由して第３インク室１７に流れ込む。

【００５９】このとき、図９に示すように、第３インク室１６から連通口１５Ａを通過したインクは、流速を上げながら攪拌部材７の傾斜面７Ａに沿って流れ、方向を変えて上方に向かって流れる。そして、第３インク室１７内に形成された円弧状の壁２４で流れを遮られ、第３インク室１７内で渦流を発生してインクを攪拌する。

【００６０】そして、攪拌された第３インク室１７内のインクは、フィルタ収容室３４を区画する壁２６の連通口２６Ａを通過して第４インク室２３を通り、インク流路２８Ａへ流れ込む。

【００６１】インク流路２８Ａを流れたインクは、インク流通空間９に流れ込む。上記インク流通空間９を通過したインクは、貫通穴２９の大円側から小円側と流れ、連通口２４Ａを通過してフィルタ収容室３４の上部に流れ込む。

【００６２】ついで、フィルタ収容室３４に流入したインクは、フィルタ５５でろ過され、貫通穴２５Ａを通過して差圧弁収容室３３に流れ込み、前述したように膜弁５２の開閉動作により所定の負圧でインク供給口４に流れ込む。

【００６３】ここで、第１インク室１１は、大気連通路１３，１３’および通孔６７を介して大気に連通されていて、大気圧に維持されているから、負圧が発生してインクの流れを阻害することにはならない。

【００６４】このように、上記カートリッジ１では、第３インク室１６から第３インク室１７に向かってインクが流れる連通口１５Ａの下流側に、インクの方向を変化させてインクを攪拌する攪拌部材７が設けられているため、上記連通口１５Ａを流れる際にカートリッジ１内のインクが自動的に攪拌される。したがって、従来のように、インク貯蔵部や記録装置自体の構造の複雑化やコストアップをすることなく、簡易な構造でインクの沈降を効果的に防止できる。

【００６５】図１０および図１１は、本発明の第２の実施の形態を示す。この例では、第３インク室１７の底面に、キャリッジ７５の移動方向（図示の矢印Ｂ）に対する傾斜面３２が形成されている。上記傾斜面３２は、上側ほど傾斜角度が徐々に大きくなるよう形成されている。

【００６６】これにより、キャリッジ７５の往復移動に伴って第３インク室１７内をキャリッジ７５の移動方向に揺動するインクが、上記傾斜面３２に沿って上下方向への流れを生じて渦となり、自動的に攪拌される。また、上記傾斜面３２は、第３インク室１７の底面に形成されているため、第３インク室１７内のインクが残り少なくなっても効果的に攪拌される。それ以外は、上記実施の形態と同様であり、同様の部分には同じ符号を付している。このカートリッジでも、上記実施の形態と同様の作用効果を奏する。

【００６７】

【発明の効果】以上のように、本発明の第１のインク貯留タンクによれば、インクが流れる流路部を備え、上記流路部の近傍に、流路部を流れるインクの方向を変化させてインクを攪拌する攪拌部材が設けられているため、上記流路部を流れる際にインク貯留タンク内のインクが自動的に攪拌される。したがって、従来のように、インク貯蔵部や記録装置自体の構造の複雑化やコストアップをすることなく、簡易な構造でインクの沈降を効果的に防止できる。

【００６８】また、本発明の第２のインク貯留タンクによれば、インクを貯留するインク室内に、キャリッジの移動方向に対する傾斜面が形成されているため、キャリッジの往復移動に伴ってインク室内をキャリッジの移動方向に揺動するインクが、上記傾斜面に沿って上下方向への流れを生じ、自動的に攪拌される。したがって、従来のように、インク貯蔵部や記録装置自体の構造の複雑化やコストアップをすることなく、簡易な構造でインク

の沈降を効果的に防止できる。

【図面の簡単な説明】

【図１】本発明が適用されるインクジェット式記録装置を示す斜視図である。

【図２】本発明が適用されたインクカートリッジの一実施の形態を示す分解斜視図である。

【図３】上記インクカートリッジを示す分解斜視図である。

【図４】容器本体の開口部の状態を示す図である。

【図５】攪拌部材の周辺構造を示す拡大図である。

【図６】負圧発生手段収容室の断面構造を示す拡大図である。

【図７】大気連通用のバルブ収容室の断面構造を示す拡大図である。

【図８】カートリッジホルダの一例を示す図である。

【図９】上記インクカートリッジの作用を示す説明図である。

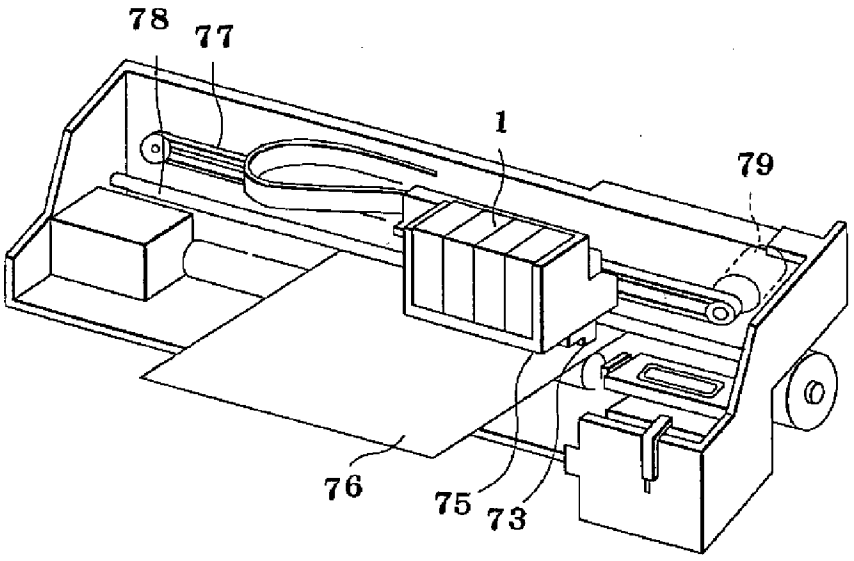
【図１０】本発明の第２の実施の形態のインクカートリッジを示す図である。

【図１１】上記インクカートリッジを示すＡ－Ａ断面図である。

【符号の説明】

１	インクカートリッジ
２	容器本体
３	蓋体
４	インク供給口
５，６	係止部材
７	攪拌部材
８	バルブ収容室
９	インク流通空間
１０	壁
１１	第１インク室
１２	壁
１３	大気連通路
１４	枠状部
１４Ａ	上面
１５	壁
１５Ａ	連通口
１６	第２インク室
１７	第３インク室
１８	連通流路
１８Ａ	凹部
１９	壁
１９Ａ，１９Ｂ	連通口
２０	インク注入口
２１	空気排出口
２２	壁
２３	第４インク室
２４，２５	壁
２５Ａ	インク流通口
２５Ｂ	弁座部
２６，２７	区画壁
２６Ａ，２７Ａ	連通口
２８	インク流路
２９	貫通穴
３０	壁
３０Ａ	凹部
３１	フィルタ取付部
３２	傾斜面
３３	差圧弁収容室
３４	フィルタ収容室
３５	凹部
３６	細溝
３７	溝
３８	凹部
３９	枠部
４０	リブ
４１	貫通穴
４５	溝
４６	貫通穴
４７	連通口
５０	バネ
５１	貫通穴
５２	膜弁
５２Ａ	厚肉部
５２Ｂ，５３Ａ	バネ受け部
５３	蓋体
５４	枠部
５５	フィルタ
５６，５６’，５７	遮気性フィルム
６０	貫通穴
６１	押圧部材
６２	弾性部材
６３，６４	突起
６５	弁体
６６	アーム
６６Ａ	回動支点
６６Ｂ	凸部
６７	通孔
７０	作動杆
７１	カートリッジホルダ
７２	インク供給針
７３	記録ヘッド
７５	キャリッジ
７６	記録紙
７７	タイミングベルト
７８	ガイドバー
７９	ステッピングモータ

【図１】


78
77
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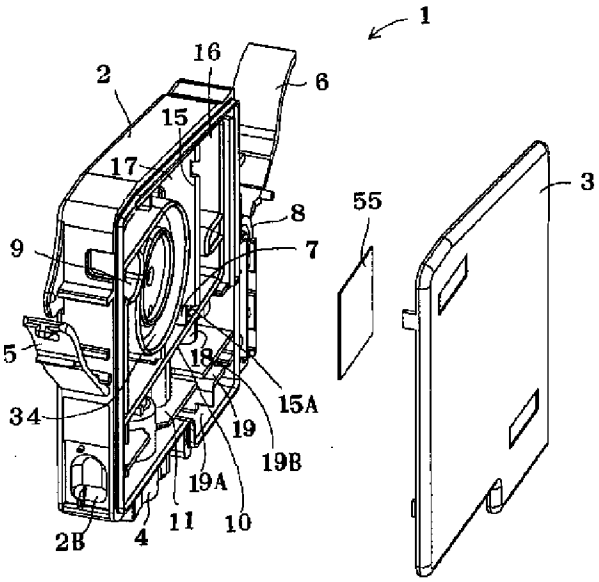
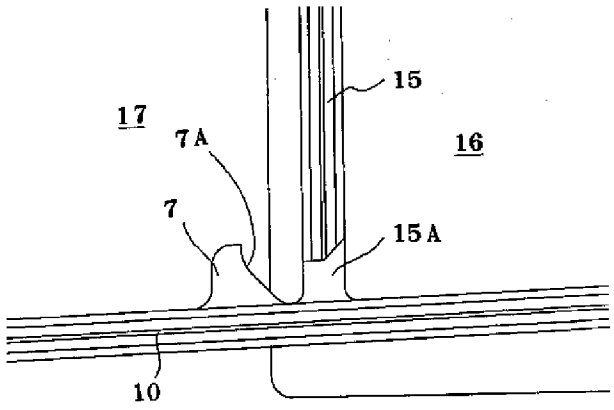
79
76
75
73

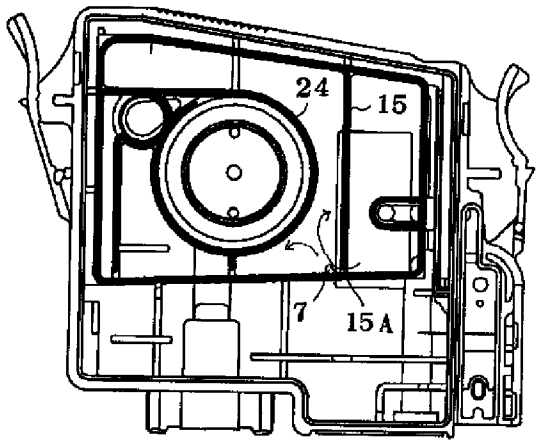
【図２】


1
16
2
6
15
17
8
55
3
9
7
5
18
15A
34
19
19B
19A
11
10
2B
4

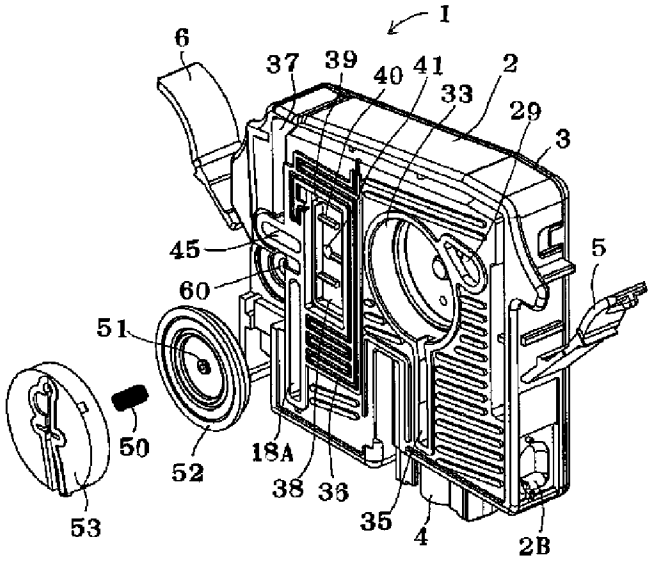
【図５】


15
17
7A
16
7
15A
10

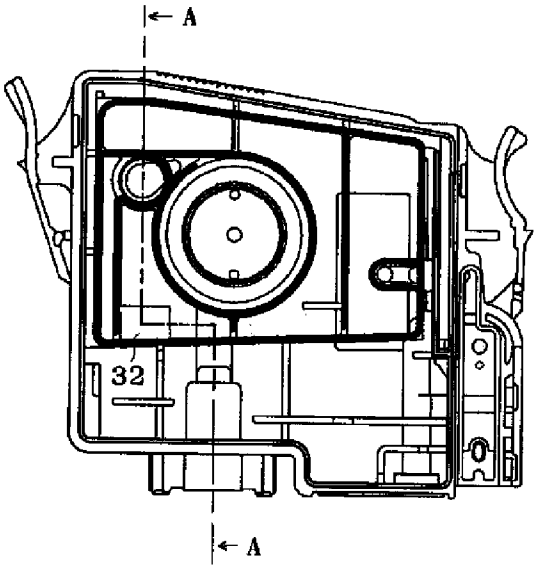
【図９】


24
15
7
15A

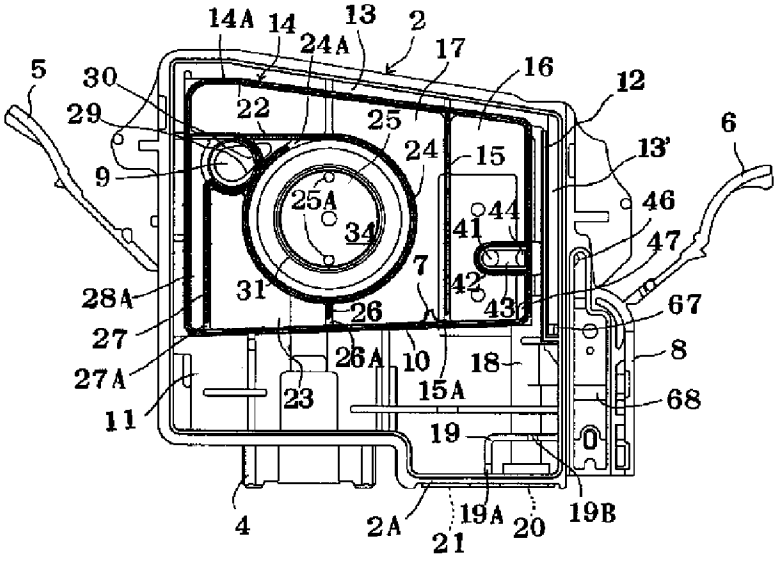
【図３】


1
6
37
39
40
41
2
33
29
3
45
5
60
51
50
52
18A
38
36
35
4
2B
53

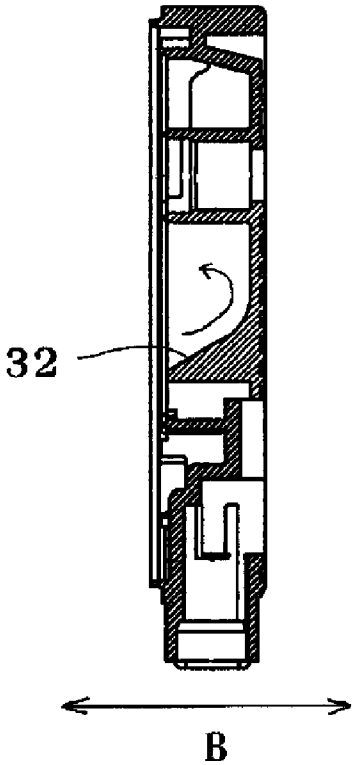
【図１０】


A
32
A

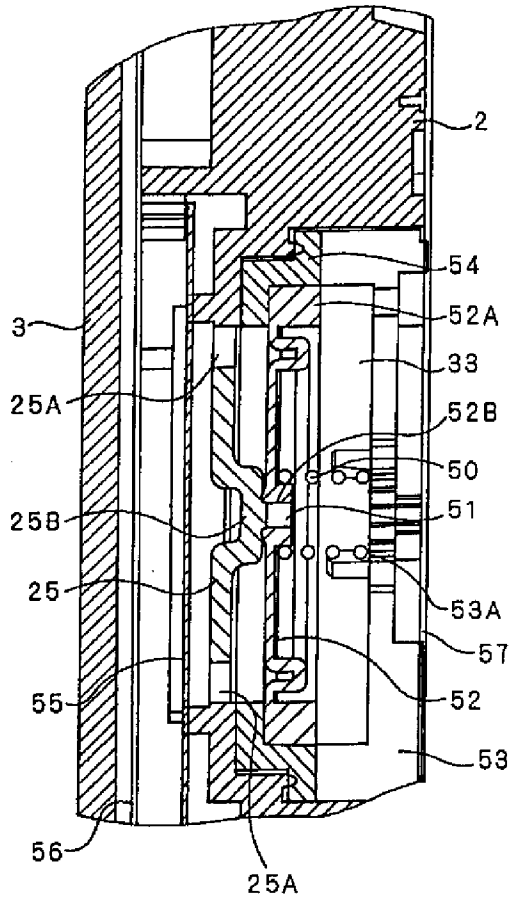
【図４】


14A
14
13
2
24A
17
16
12
5
30
29
22
25
24
15
13'
6
9
25A
44
46
34
41
47
28A
31
7
42
43
67
27
26
26A
10
18
8
27A
23
15A
68
11
19
4
2A
19A
20
19B
21

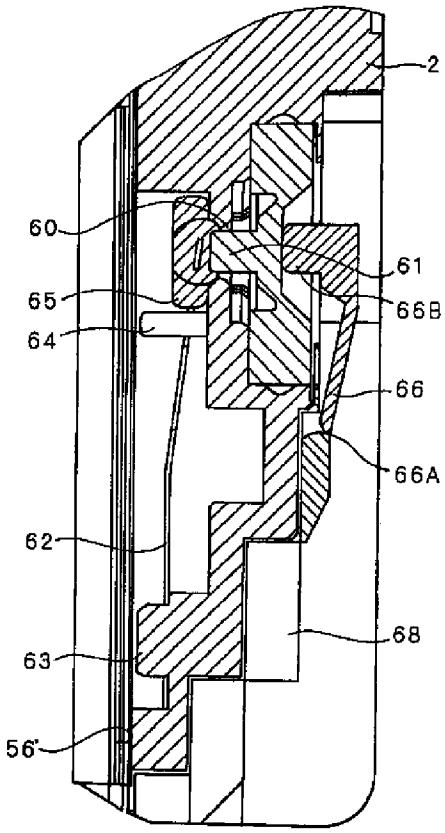
【図１１】


32
B

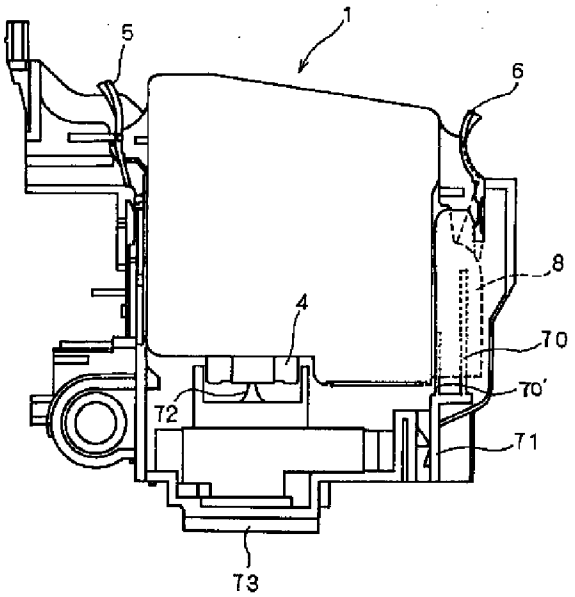
【図６】


2
54
52A
3
33
25A
52B
50
51
25B
25
53A
57
55
52
53
56
25A

【図７】


2
60
61
65
66B
64
66
66A
62
68
63
56'

【図８】


1
5
6
8
4
70
70'
72
71
73

フロントページの続き

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Ｆターム(参考)　2C056 KB05 KB27 KC09 KC13 KC16 KC22 KC30